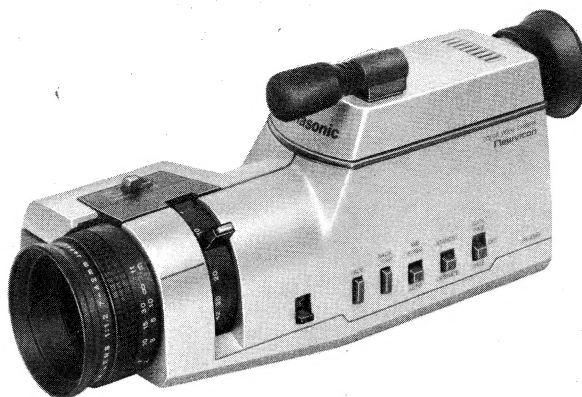


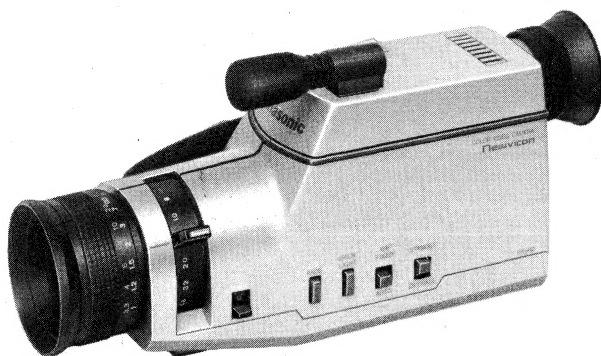
Service Manual

Color Video Camera

PK-450B
PK-450S
PK-410



PK-450S



PK-410



PK-450B

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Diagrams
Printed Circuit
Board Diagrams***Vol. 5***Exploded Views
Replacement
Parts List*

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Service Manual

Color Video Camera

PK-450B
PK-450S
PK-410

Vol. 1

Summary


PK-450B

SPECIFICATIONS

Power Source: DC 12V \pm 10%
 AC 120V \pm 10%, 60 Hz \pm 0.5%
 (with Power Supply Unit)

Power Consumption: DC 4.6W at 12V DC (Battery)
 (5.0W with Auto Focus on)

Newvicon Tube
 System: 1/3" frequency separation single tube
 system (built-in stripe filter)

Single Carrier
 Frequency: 3.58 MHz

Focus System: Electro-static type

Lens Mounting: Built-in zoom lens (not "C" mount)

Lens: 6:1 zoom lens with auto iris control
 Power zoom lens and macro construction
 F: 1.2, f: 7mm—42mm (Auto Focus)
 d: 1.2m to infinity (Auto Focus)
 F: 1.4, f: 8mm—48mm (Manual Focus)
 d: 1.0m to infinity (Manual Focus)

Lens Diameter: 49mm

Light Sensitivity: Minimum light intensity on optical
 image: 20 Lux (F: 1.2) (Auto Focus)
 30 Lux (F: 1.4) (Manual Focus)
 Optimum light intensity on optical
 image: 900 Lux

Video Output Level: 1.0Vp-p, 75 Ω (standard NTSC signal)

Sync. System: Internal Sync: RS-170

Signal to Noise Ratio: More than 45dB

Horizontal Resolution: 260 lines

Color Temperature

Control: 2 step switch (indoor/outdoor) & Auto
 adjust

Microphone: Condenser microphone

Audio Output Level: -20dB, Hi-impedance

Audio Output

Impedance: High impedance (1k Ω)

External Microphone

Input Impedance: 600 Ω unbalanced

Electronic Viewfinder: Mono chrome 1/2 inch CRT

Operating

Temperature: 5°C to 40°C

Operating Humidity: 10% to 75%

Operating Position: Normal position only

Weight:

Without handle grip

2.4 lbs (with lens, 7 ft cable) (Auto Focus)

Without handle grip

2.0 lbs (with lens, 7 ft cable) (Manual Focus)

AC adapter (option)

2.4 lbs

Dimensions:

10.2"(W) \times 3.7"(H) \times 4.3"(D) (Auto Focus)

258mm(W) \times 94mm(H) \times 110mm(D)

9.2"(W) \times 4.3"(H) \times 3.7"(D) (Manual Focus)

234mm(W) \times 110mm(H) \times 94mm(D)

Weight and dimensions shown are approximate.

Specifications are subject to change without notice.

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GENERAL SAFETY PRECAUTIONS

PRODUCT COMPLIES WITH DHHS PULES 21CFR SUBCHARTER
J APPLICABLE AT DATE OF MANUFACTURE
SAFETY PRECAUTION

GENERAL GUIDELINES

1. When service is required, observe the original lead dress. Components, wires or cables that indicate evidence of overheating or other electrical or mechanical damage should be replaced.
2. After servicing the camera, power supply and electronic viewfinder, all the protective devices, such as insulation tape, shields and isolation R-C combinations must be properly installed.
3. Potentials as high as 5KV are present when the electronic viewfinder is operating. Operation without the camera head side covers, finder case ass'ys of electronic viewfinder and covers of power supply unit presents a danger of shock hazard from the camera power supply.
Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions that should be taken when working on high-voltage equipment. Always discharge the anode of the picture tube to the main chassis before handling the tube.
4. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

LEAKAGE CURRENT COLD CHECK

Conduct this test on the power supply unit with the camera disconnected and repeat with the camera power supply unit and electronic viewfinder properly assembled. Also, repeat test with and without available approved accessories/cables/connectors.

1. Turn the AC switch on.
2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed terminal, screwheads and coaxial connector.
The resistance measured should not be less than ∞ (infinity).
Any resistance value below this range indicates an abnormality which requires corrective action.
3. Repeat the test with the AC switch in the "off" position.

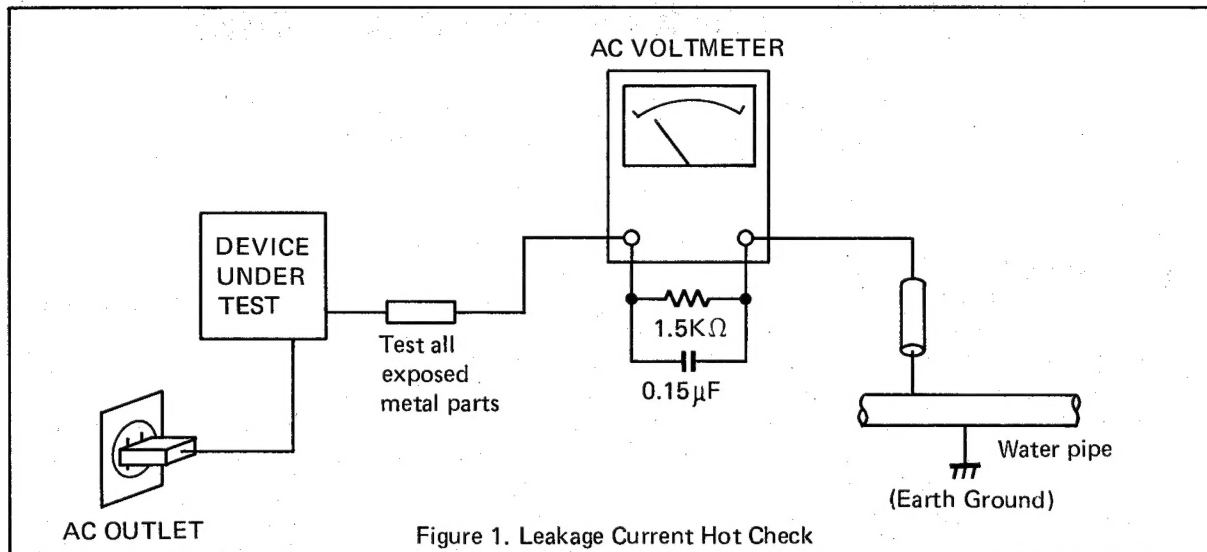
LEAKAGE CURRENT HOT CHECK

Conduct this test on the power supply unit with the camera disconnected and repeat with the camera, power supply unit and electronic viewfinder properly assembled. Also, repeat test with and without available approved accessories/cables/connectors.

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a $1.5K\Omega$ 10 watt resistor, paralleled by $0.15\mu F$ capacitor, between each exposed metallic part on the unit and a good earth ground such as a water pipe, as shown in figure 1.
3. Use an AC voltmeter, with $1000\Omega/\text{volt}$ or more sensitivity, to measure the potential across the resistor.
4. Check all exposed metallic parts of the cover (Cable connection, Handle bracket, metallic cabinet, Screwheads, Metallic overlays, etc), and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 V RMS.

A leakage current tester (FLUKE MODEL: 8000A equivalent) may be used to make the hot checks.
Leakage current must not exceed 0.5 milliamp.

In case a measurement is out side of the limits specified, there is a possibility of a shock hazard, and corrective action must be taken before returning the instrument to the customer.



X-RADIATION

1. The potential source of x-radiation in electronic viewfinder is the high-voltage section and picture tube.
2. It is important to use a periodically checked and accurate high-voltage meter, to monitor and check the high voltage.
Rotate the brightness control and contrast fully counterclockwise for this test.
3. Observe that the high voltage does not exceed the specified value.
Excessive high voltage may cause a possible x-radiation hazard.
The camera system should be repaired as soon as possible.
4. It is essential to use the specified picture tube to avoid a possible x-radiation hazard.

ELECTROSTATICALLY SENSITIVE (ES) DEVICES

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device).

IMPORTANT PRECAUTIONS

LOCATION & USE

- **Storage of your Camera**

Store and handle your camera in a manner that will not subject it to unnecessary movement (avoid shaking and striking). The camera contains a sensitive pick-up tube which could be damaged by improper handling or storage. The camera should not be stored under conditions where temperatures are over 149°F (65°C).

- **Avoid extreme environments**

Do not use the camera when high or low temperature or high humidity exist. Proper performance of the camera is not obtained in extreme temperature environments.

- **Do not leave the camera in direct sunlight.**

When the viewfinder eyepiece is exposed to direct sunlight it works as a magnifying glass. The concentrated sunlight can cause damage to internal parts of the camera.

- **Do not aim the camera at the sun or other bright objects.**

This action could permanently damage the pick-up tube whether the camera is turned on or off.

- **Do not leave the camera or the power supply turned on when not in use.**

- **Do not block the ventilation slots**

The ventilation slots prevent abnormal increases of internal temperature.

- **To avoid shock hazard**

Do not attempt to disassemble this unit. There are no serviceable parts inside. The camera and power supply should be operated on power line voltages of 120V AC at 60Hz. The camera and power supply should not be exposed to rain or moisture. Do not operate the camera or power supply if it becomes wet. Unplug the camera from the power supply before cleaning.

CARE

- **To clean your camera**

Do not use strong or abrasive detergents when cleaning the camera body.

- **To protect the lens**

Always replace the lens cap on the camera lens when the camera is not in use. Do not touch the surface of the lens with your hand. Use a commercial camera lens solution and paper when cleaning the lens. Improper cleaning can scratch the lens coating.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure; that may be of sufficient magnitude to constitute a risk of electric shock to persons.

CAUTION

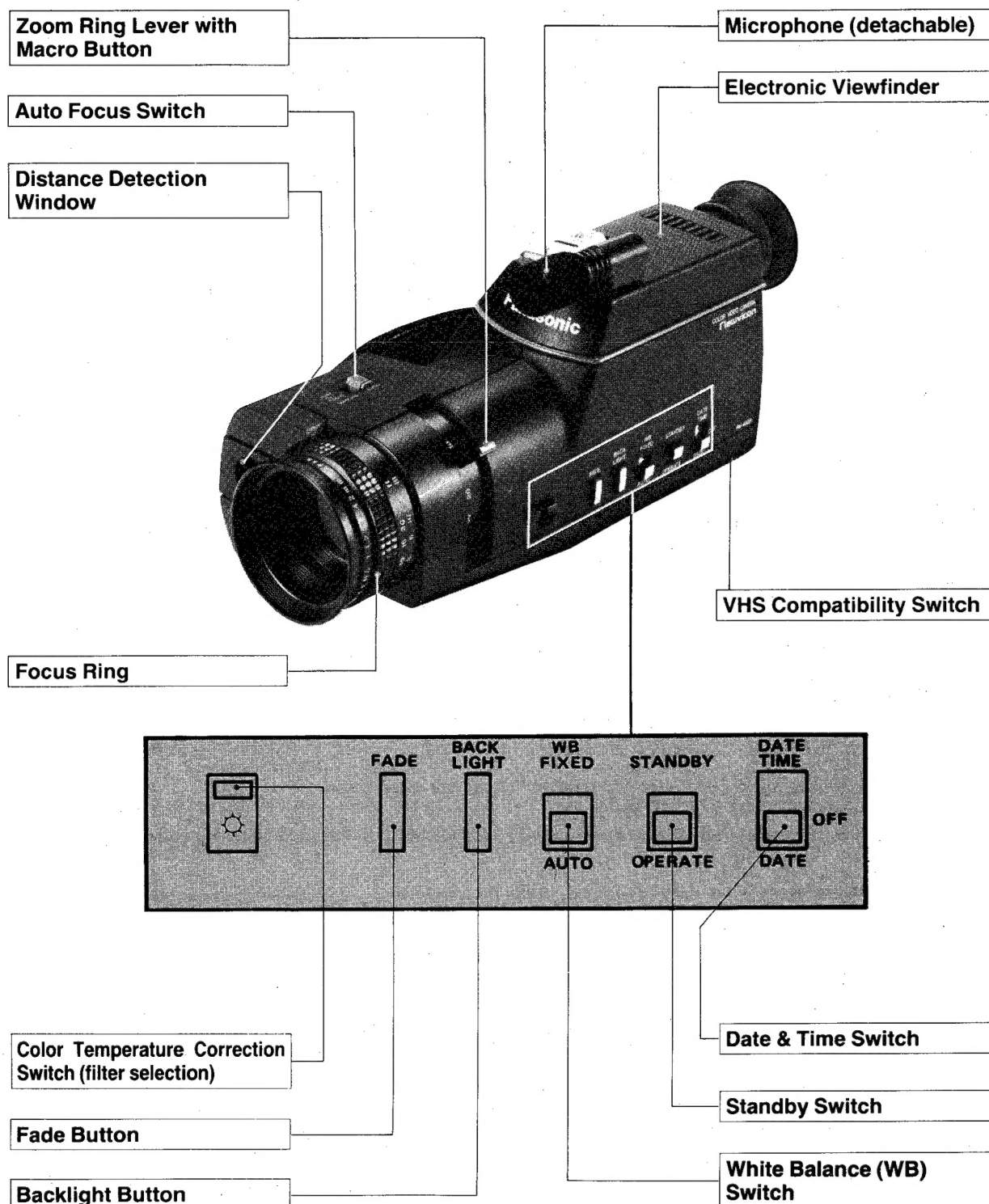
RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



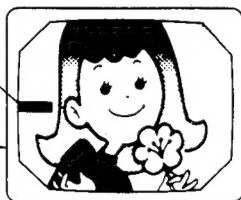
The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

CAMERA FEATURES AND CONTROLS



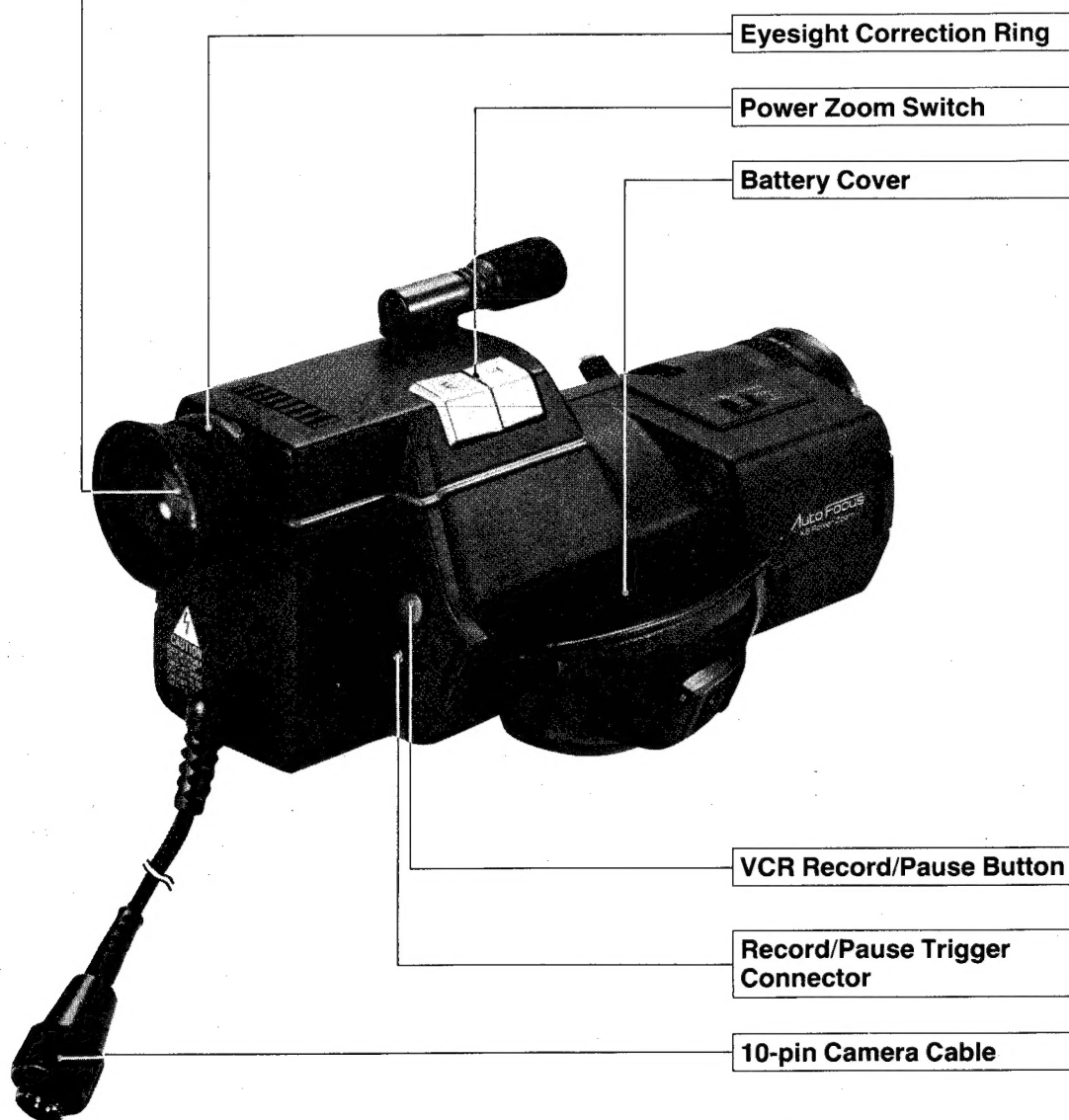
**Light Intensity
Indicator
(white bar)**

Viewfinder



 : Outdoor Filter indicator (orange)

R : Record/Pause indicator (green)



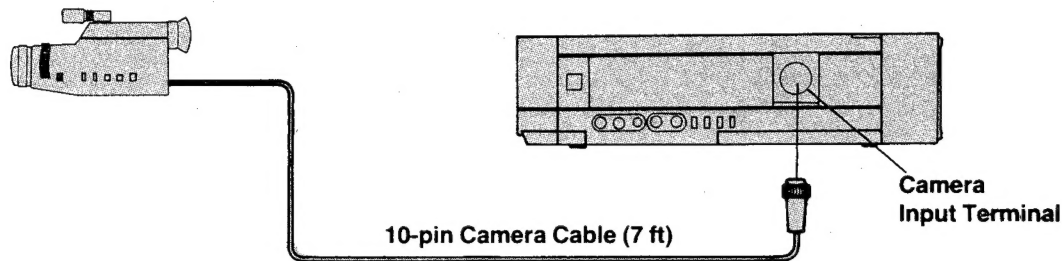
CONNECTION DIAGRAM

The camera must be connected to a VCR and/or power source because the camera does not have a power source of its own. Connect the camera as shown.

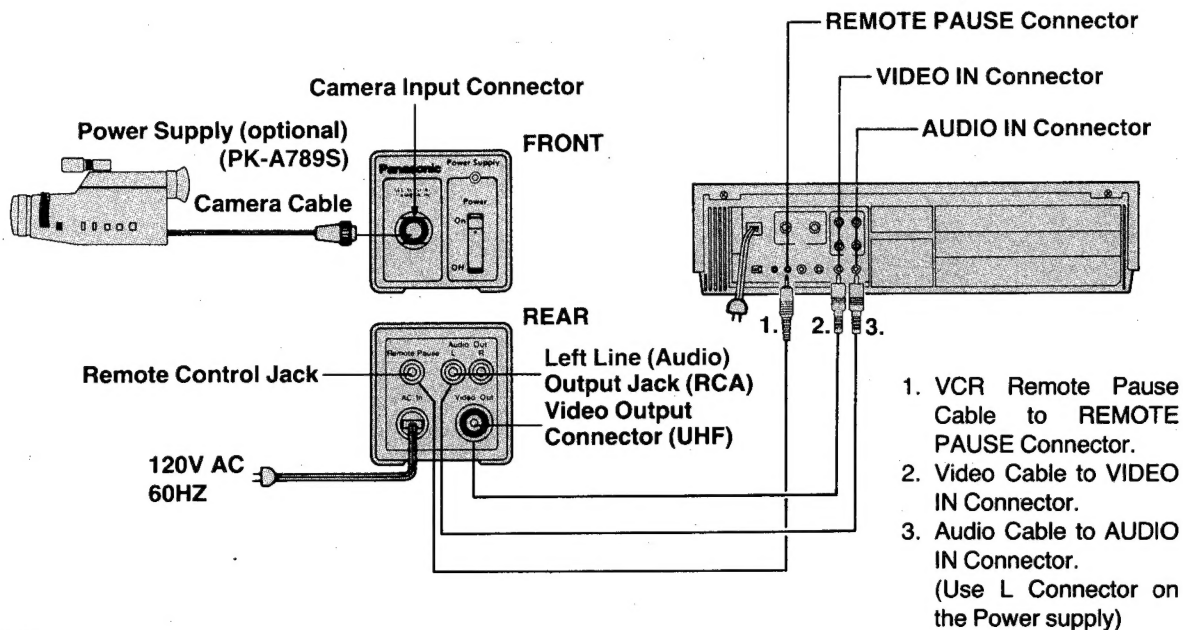
Note all power should be off when making cable connections.

Connecting cables with power on can damage the units.

A: Camera Head and portable VCR or VCR with 10-pin connector



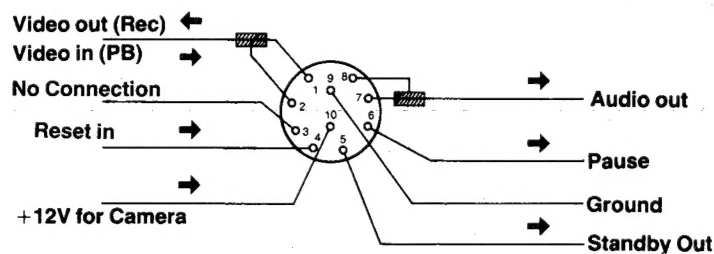
B: Camera Head, optional power supply and VCR without 10-pin connector



Note:

- The camera cable between camera head and power supply or between camera head and portable VCR can be extended by using the optional extension camera cables. (Use three 20 feet extension cables to extend upto 67 feet)
- The connections between the VCR and TV set are explained in the operating instructions for the VCR.

10 Pin Camera Connector Diagram

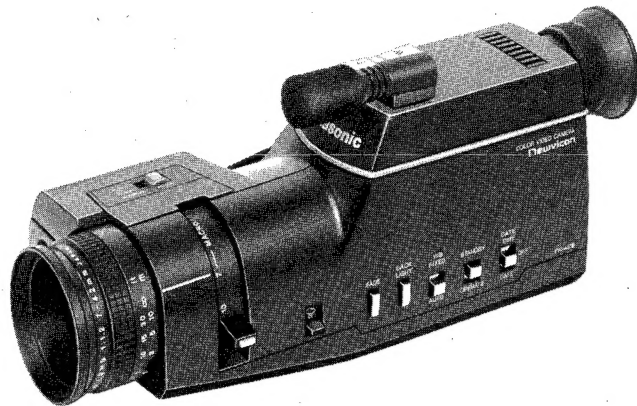


Service Manual

Color Video Camera

Vol. 2

Adjustment Procedures

PK-450B
PK-450S
PK-410


PK-450B

SPECIFICATIONS

Power Source: DC 12V \pm 10%
AC 120V \pm 10%, 60Hz \pm 0.5%
(with Power Supply Unit)

Power Consumption: DC 4.6W at 12V DC (Battery)
(5.0W with Auto Focus on)

Newvicon Tube
System: 1/3" frequency separation single tube
system (built-in stripe filter)

Single Carrier
Frequency: 3.58MHz

Focus System: Electro-static type

Lens Mounting: Built-in zoom lens (not "C" mount)

Lens: 6:1 zoom lens with auto iris control
Power zoom lens and macro construction
F: 1.2, f: 7mm—42mm (Auto Focus)
d: 1.2m to infinity (Auto Focus)
F: 1.4, f: 8mm—48mm (Manual Focus)
d: 1.0m to infinity (Manual Focus)

Lens Diameter: 49mm

Light Sensitivity: Minimum light intensity on optical
image: 20 Lux (F: 1.2) (Auto Focus)
30 Lux (F: 1.4) (Manual Focus)
Optimum light intensity on optical
image: 900 Lux

Video Output Level: 1.0Vp-p, 75 Ω (standard NTSC signal)

Sync. System: Internal Sync: RS-170

Signal to Noise Ratio: More than 45dB

Horizontal Resolution: 260 lines

Color Temperature

Control: 2 step switch (indoor/outdoor) & Auto
adjust**Microphone:** Condenser microphone**Audio Output Level:** -20dB, Hi-impedance**Audio Output**Impedance: High impedance (1k Ω)**External Microphone**Input Impedance: 600 Ω unbalanced**Electronic Viewfinder:** Mono chrome 1/2 inch CRT**Operating**

Temperature: 5°C to 40°C

Operating Humidity: 10% to 75%**Operating Position:** Normal position only**Weight:**

Without handle grip

2.4 lbs (with lens, 7 ft cable) (Auto Focus)

Without handle grip

2.0 lbs (with lens, 7 ft cable) (Manual Focus)

AC adapter (option)

2.4 lbs

Dimensions:10.2"(W) \times 3.7"(H) \times 4.3"(D) (Auto Focus)258mm(W) \times 94mm(H) \times 110mm(D)9.2"(W) \times 4.3"(H) \times 3.7"(D) (Manual Focus)234mm(W) \times 110mm(H) \times 94mm(D)

Weight and dimensions shown are approximate.

Specifications are subject to change without notice.

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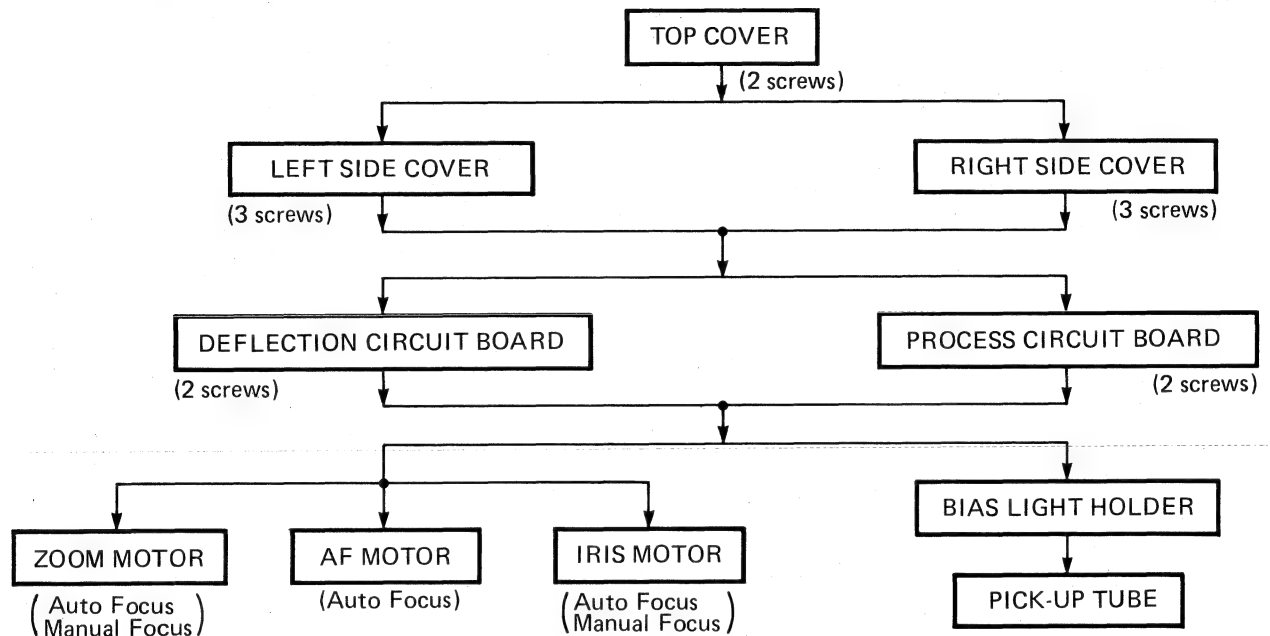
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ADJUSTMENT PROCEDURES

Disassembly Method

Caution: Camera Service must be performed in a dust free location to maintain clean lens elements.

1. DISASSEMBLY FLOW CHART



2. DETAILED DISASSEMBLY METHOD

Note:

"Left side" and "Right side" designations refer to section left and right sides of the camera when viewed from the front (lens end).

2-1. Removal of Top Cover

Unscrew 2 screws (rear side) and move the top cover assembly to the rear.

Then, remove the top cover assembly and disconnect 3 connectors (P305; P604, (M)).

2-2. Removal of Left Side and Right Side Covers

- Unscrew 7 screws (A) and disconnect 3 connectors (P304, P610, (A)) (see Fig. 1).
- Then, remove the left side and right side covers.

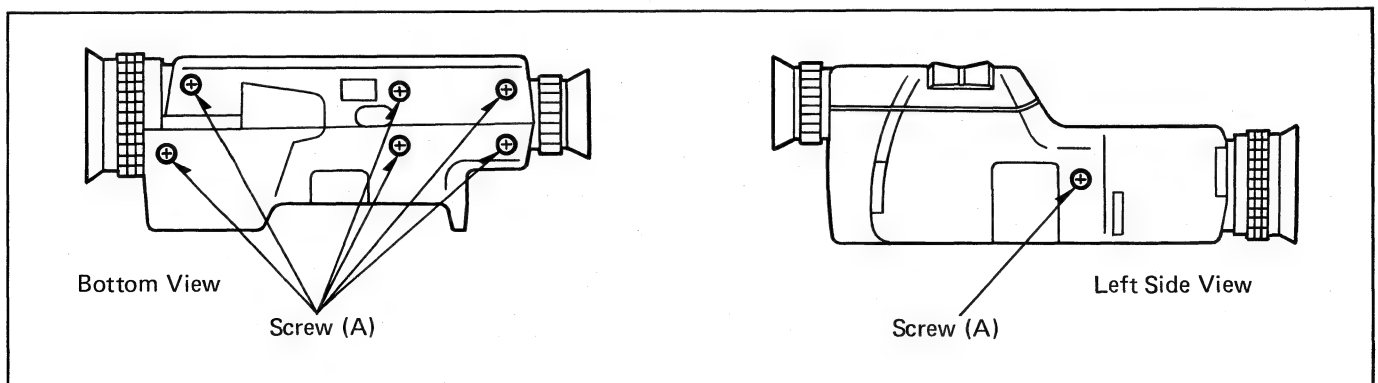


Fig. 1

- 2-3. Opening the Deflection Circuit and Process Circuit Boards Unscrew 4 screws (B) securing the circuit board to the chassis (see Fig. 2).

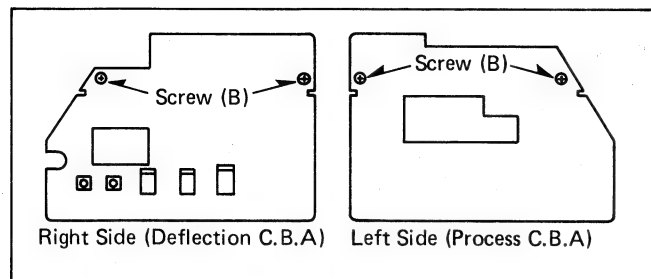


Fig. 2

3. REPLACEMENT OF THE PICK-UP TUBE

- 3-1. Remove both side covers and open the process circuit and deflection circuit boards (refer to section "Disassembly Method").
- 3-2. Disconnect a connector (P602). Unscrew a screw (A) (see Fig. 3)

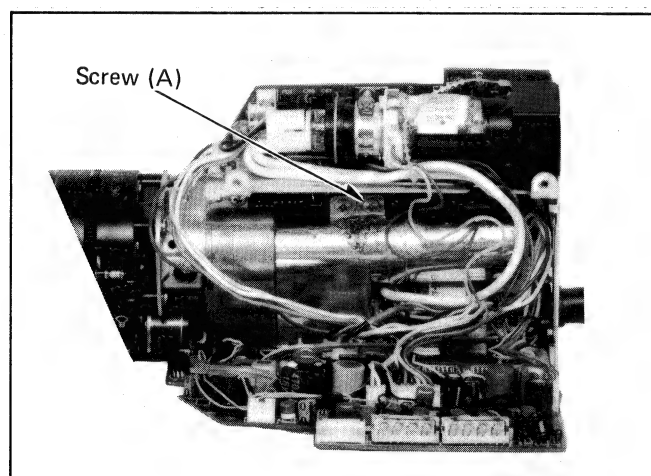


Fig. 3 Right Side View

- 3-3. Unsolder and remove the left and right socket shield cases (see Fig. 4).

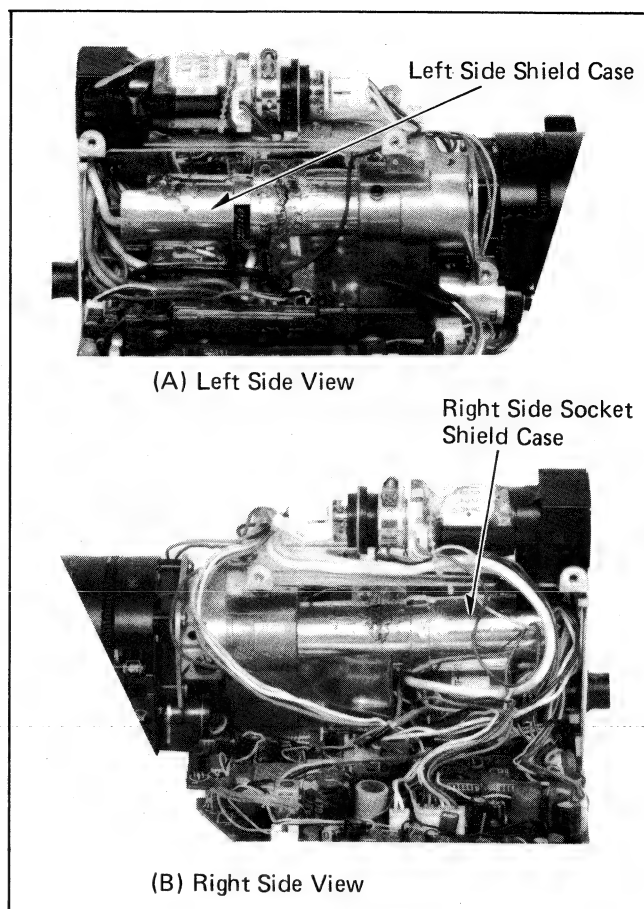


Fig. 4

- 3-4. Disconnect the bias light holder from the pick-up tube (see Fig. 5).

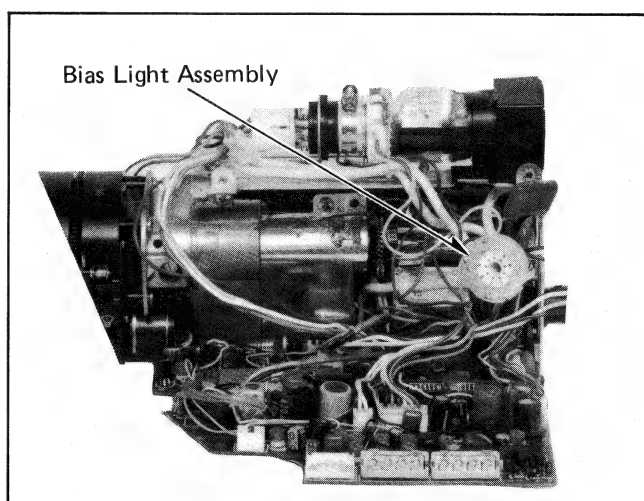


Fig. 5 Right Side View

- 3-5. Unscrew 2 screws (B) and remove the chassis cover (see Fig. 6-A/B). Then, remove the preamp and D.Y. yoke assembly (see Fig. 6-C).

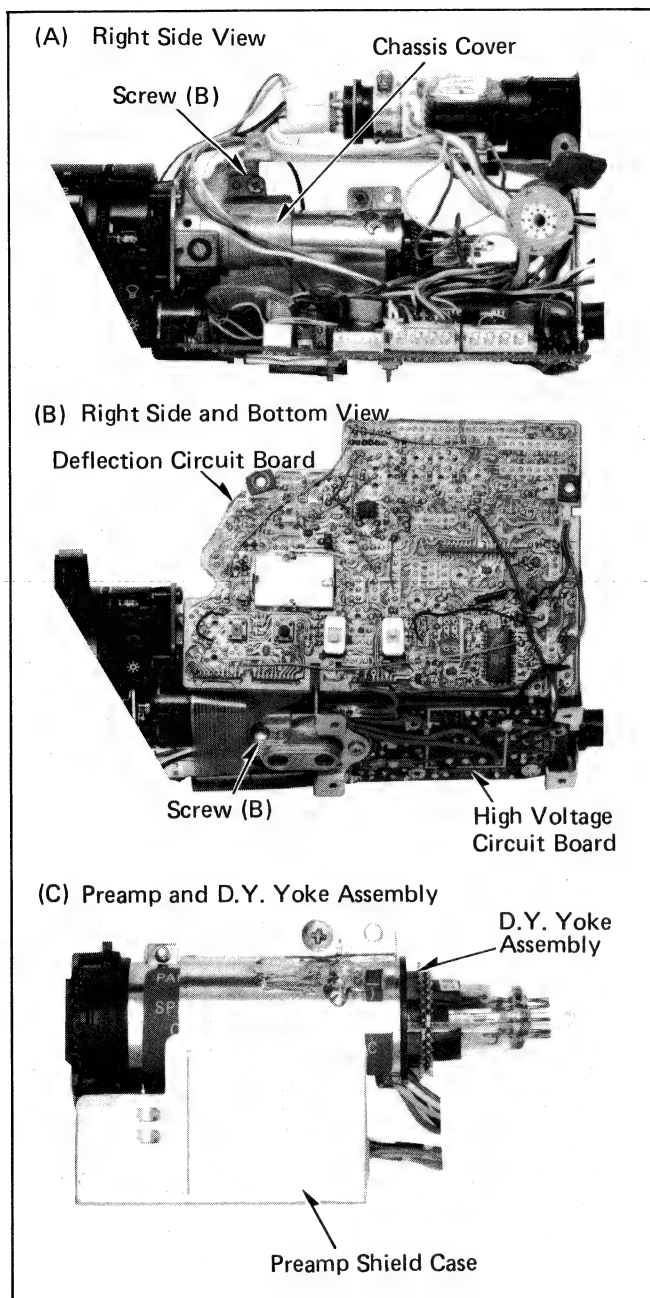


Fig. 6

- 3-6. Unsolder and remove the preamp shield case (right side) (see Fig. 7).

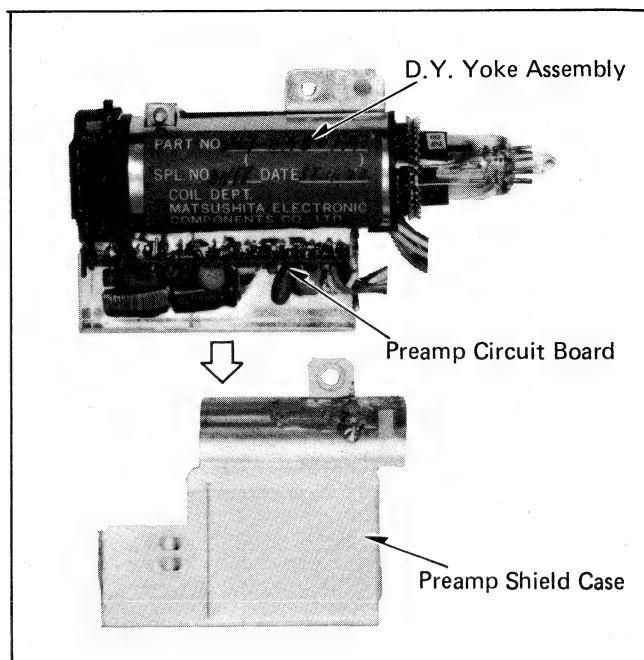


Fig. 7

- 3-7. Unsolder and remove the silver lead from the preamp circuit board (see Fig. 8).

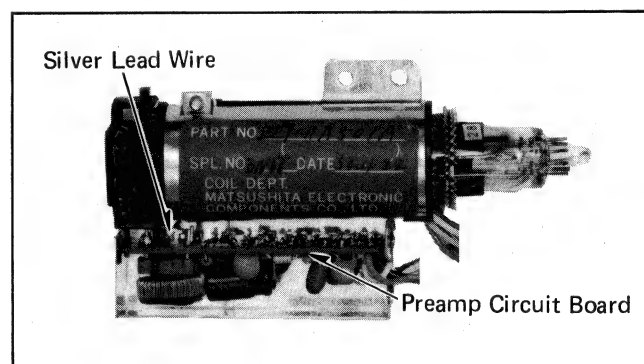


Fig. 8 Preamp and D.Y Yoke Assembly

- 3-8. Remove the pick-up tube D.Y. assembly with the filter assembly (see Fig. 9).

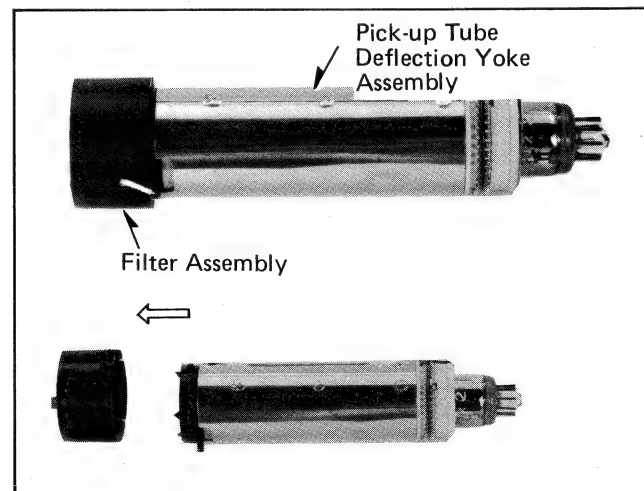


Fig. 9

- 3-9. Loosen the clamp screw and remove the pick-up tube from the deflection yoke assembly (D.Y) (see Fig. 10).

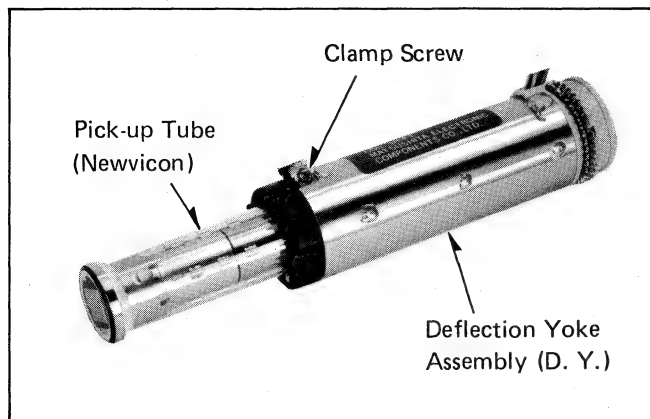


Fig. 10

- 3-10. Install the new pick-up tube (S4400) in the deflection yoke assembly (see Fig. 11).

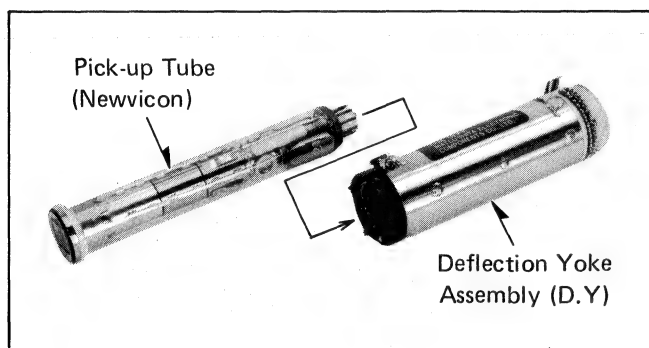


Fig. 11

- 3-11. Line up the plastic tab on the D.Y. assembly with the silver line on the face of the pick-up tube as shown in Fig. 12.

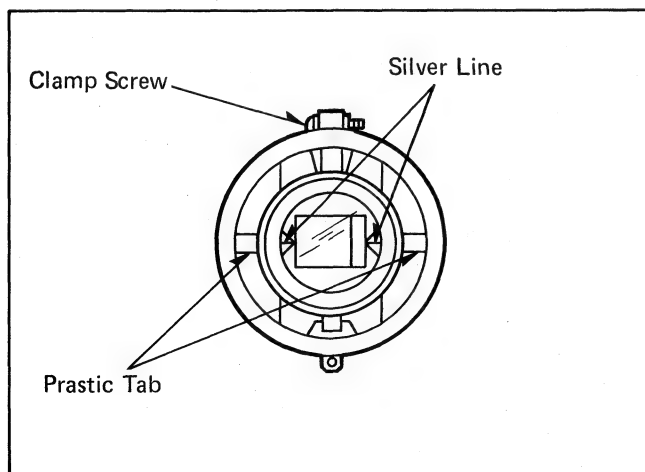


Fig. 12

- 3-12. Push the pick-up tube in the D.Y assembly as far as it will go...using lens cleaning tissue paper to keep the face palte spotless (see Fig. 13).

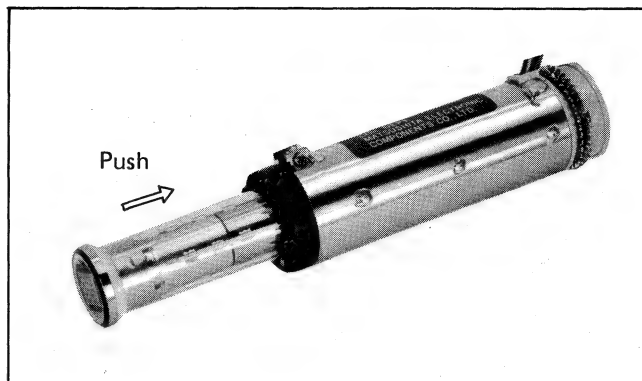


Fig. 13

- 3-13. Reverse the previous steps.

4. REPLACEMENT OF THE POWER ZOOM LENS (MANUAL FOCUS MODEL)

- 4-1. Remove the both side covers, open the process circuit and the deflection circuit boards (refer to section "Disassembly Method").
- 4-2. Disconnect a connector (P301). Then, loosen the hex screw (A) (see Fig. 14-A/B).

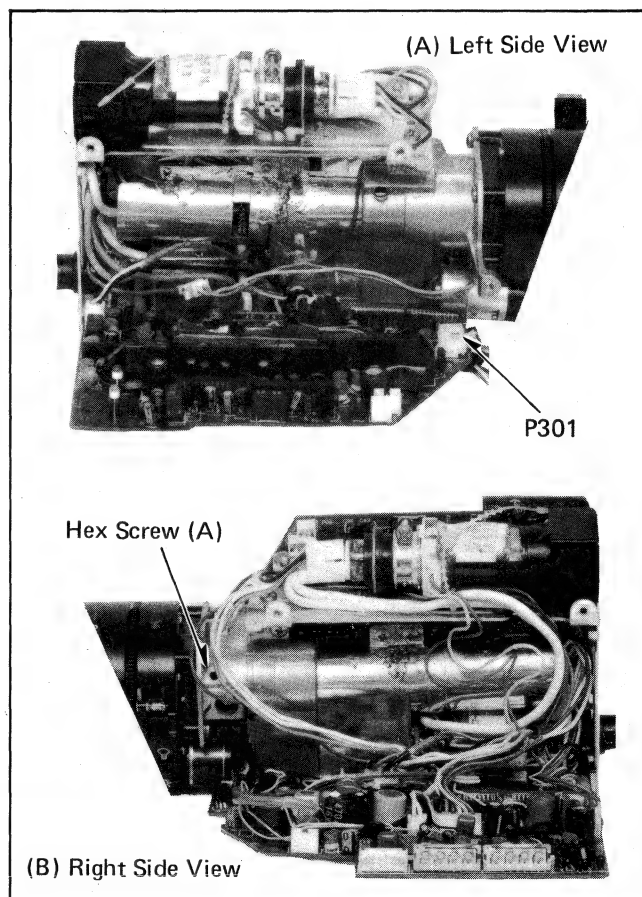


Fig. 14

- 4-3. Unscrew 4 screws (B) and remove the zoom lens (see Fig. 15-A/B/C).

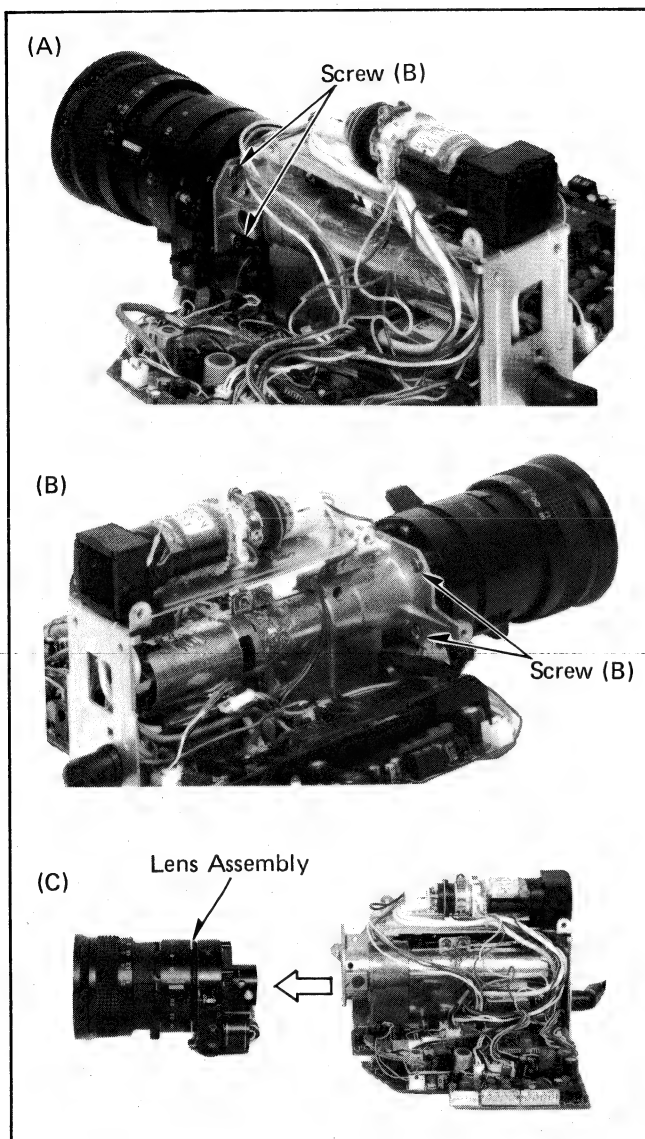


Fig. 15

5. REPLACEMENT OF ZOOM MOTOR (VEKW0854) (MANUAL FOCUS MODEL)

- 5-1. Remove the zoom lens (refer to section "Replacement of the Power Zoom Lens").
5-2. Unscrew 2 screws (A) and remove the zoom motor (see Fig. 16).

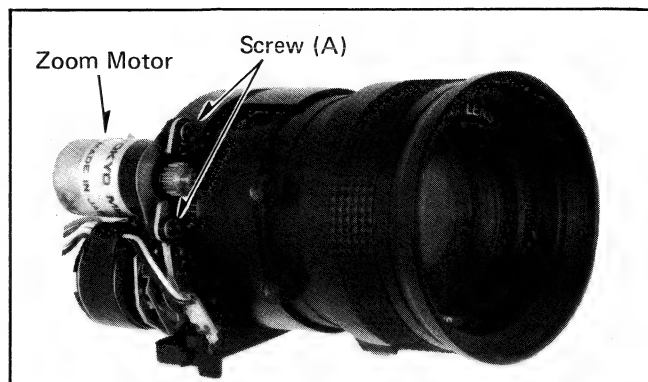


Fig. 16 Zoom Motor

6. REPLACEMENT OF IRIS MOTOR (VVAW0022) (MANUAL FOCUS MODEL)

- 6-1. Remove the power zoom lens (refer to section "Replacement of the Power Zoom Lens").
6-2. Unscrew 3 screws (A) and a screw (B). Then, remove the iris motor assembly and filter holder assembly (see Fig. 17).

Note: Be careful not to drop a white ball.

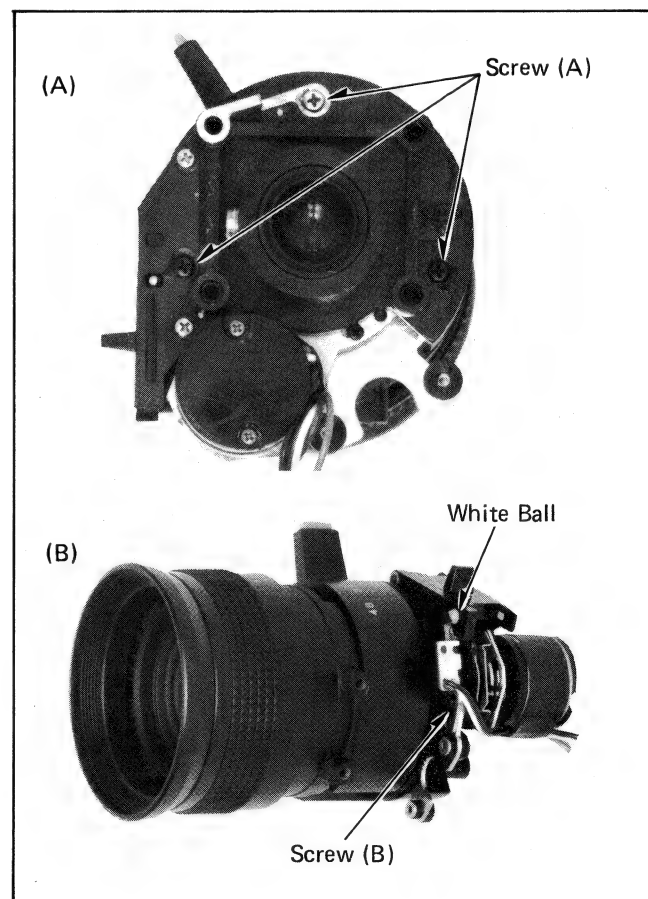


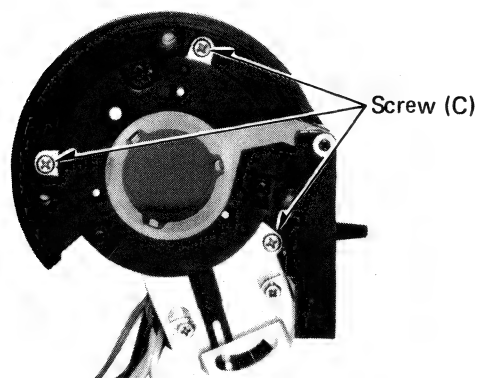
Fig. 17

- 6-3. Unscrew 3 screws (C) and remove the iris motor assembly (see Fig. 18).

7. REPLACEMENT OF THE POWER ZOOM LENS (AUTO FOCUS MODEL)

- 7-1. Remove the both side covers, open the process circuit and the deflection circuit boards (refer to section "Disassembly Method.").
- 7-2. Disconnect a connector (P301). Then, loosen the hex screw (A) (see Fig. 19-A/B).

(A) Iris Motor Assembly and Relay Lens Assembly



(B)

Relay Lens Assembly

Iris Motor Assembly

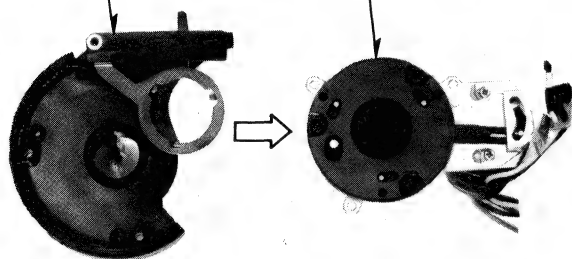
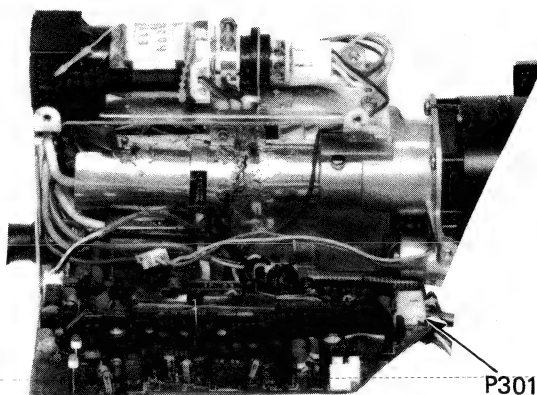


Fig. 18

(A) Left Side View



(B) Right Side View

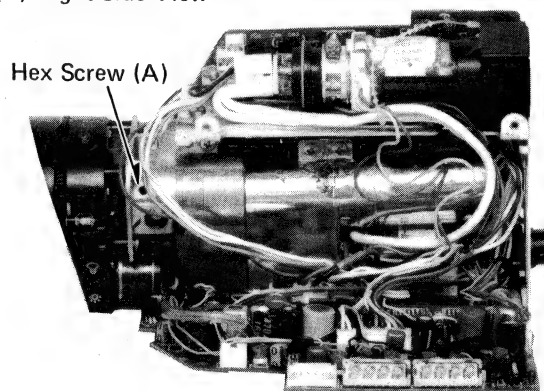


Fig. 19

- 7-3. Unscrew 4 screws (B) and remove the zoom lens (see Fig. 20-A/B/C).

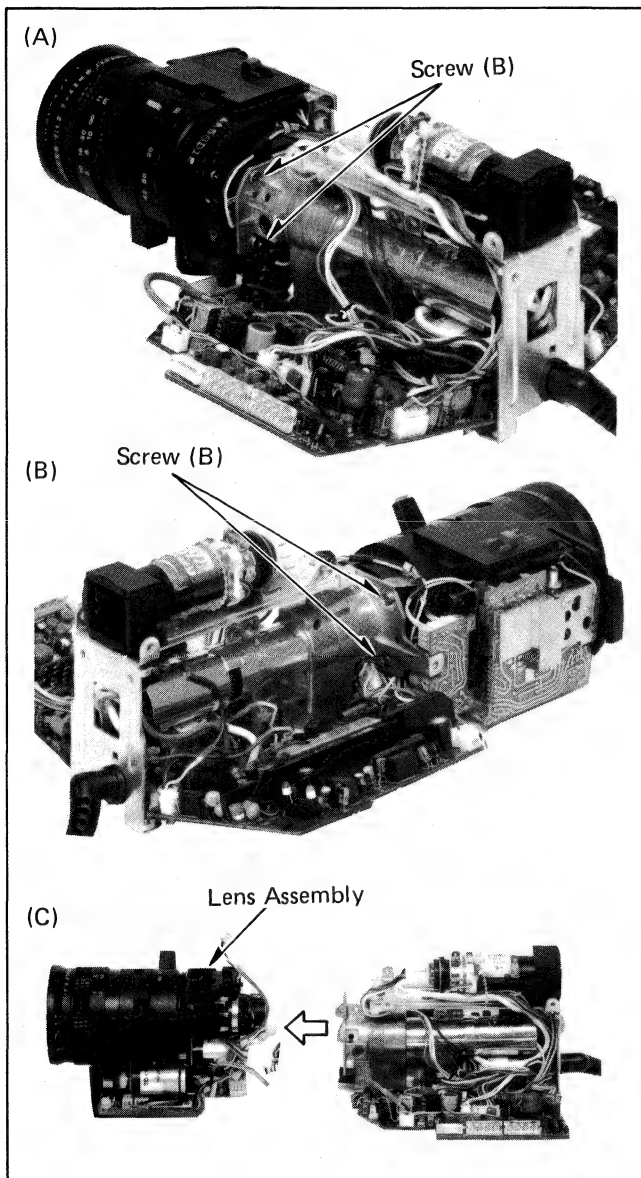


Fig. 20

8. REPLACEMENT OF ZOOM MOTOR (VEKW0835) (AUTO FOCUS MODEL)

- 8-1. Remove the zoom lens (refer to section "Replacement of the Power Zoom Lens").
8-2. Unscrew 2 screws (A) and remove the zoom motor (see Fig. 21).

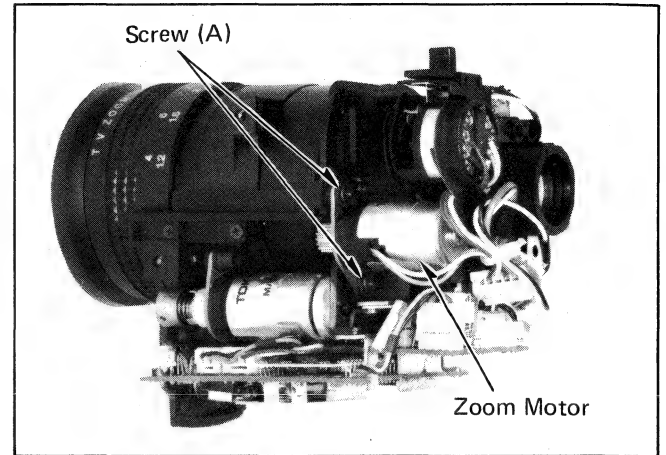


Fig. 21

9. REPLACEMENT OF AUTO FOCUS MOTOR (AUTO FOCUS MODEL) (VEKW0834)

- 9-1. Remove the zoom lens (refer to section "Replacement of the Power Zoom Lens").
9-2. Unscrew 2 screws (A) and disconnect a connector (B).
Then, remove the auto focus motor (see Fig. 22).

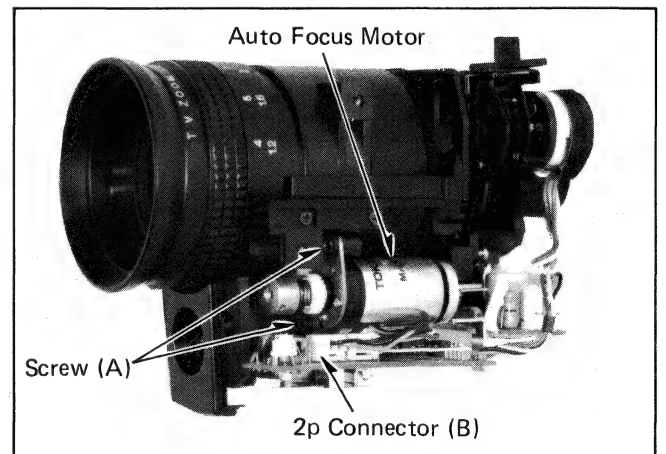


Fig. 22

10. REPLACEMENT OF THE IRIS MOTOR ASSEMBLY (AUTO FOCUS MODEL) (VVAW0021)

- 10-1. Remove the power zoom lens (refer to section "Replacement of the Power Zoom Lens).
- 10-2. Unscrew 4 screws (A), a screw (B) and a screw (C). Disconnect a connector. Then, remove the iris motor assembly (see Fig. 23-A/B).

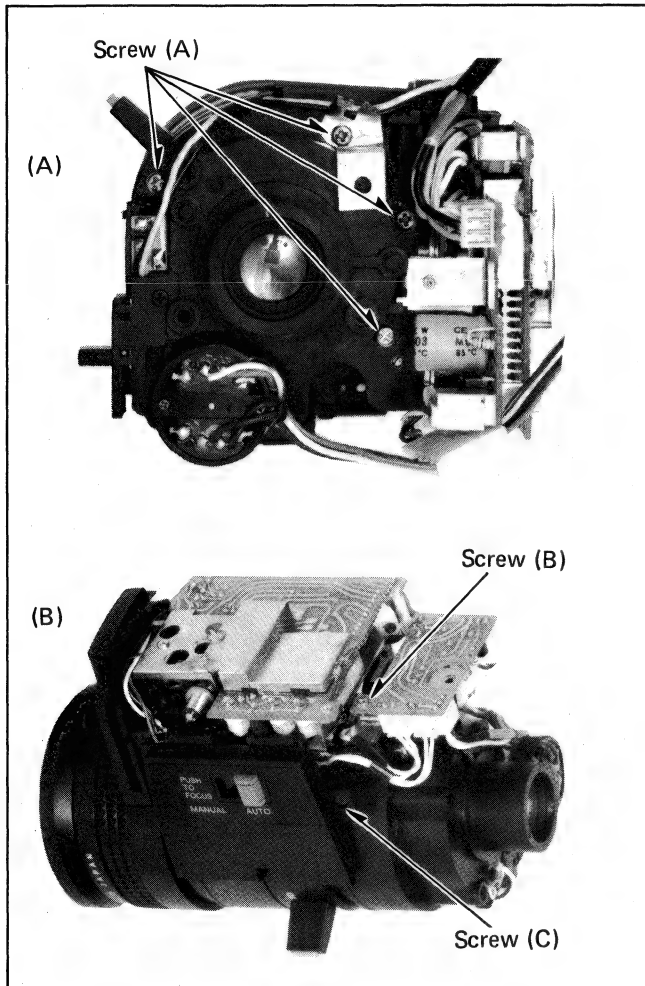


Fig. 23

- 10-3. Unscrew 2 screws (D) and remove the filter holder assembly (see Fig. 24).

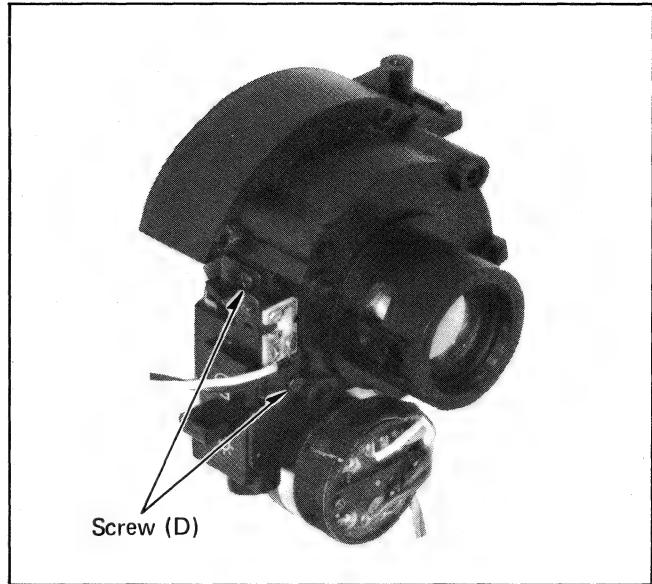


Fig. 24

- 10-4. Unscrew 3 screws (E) and remove the iris motor assembly (see Fig. 25).

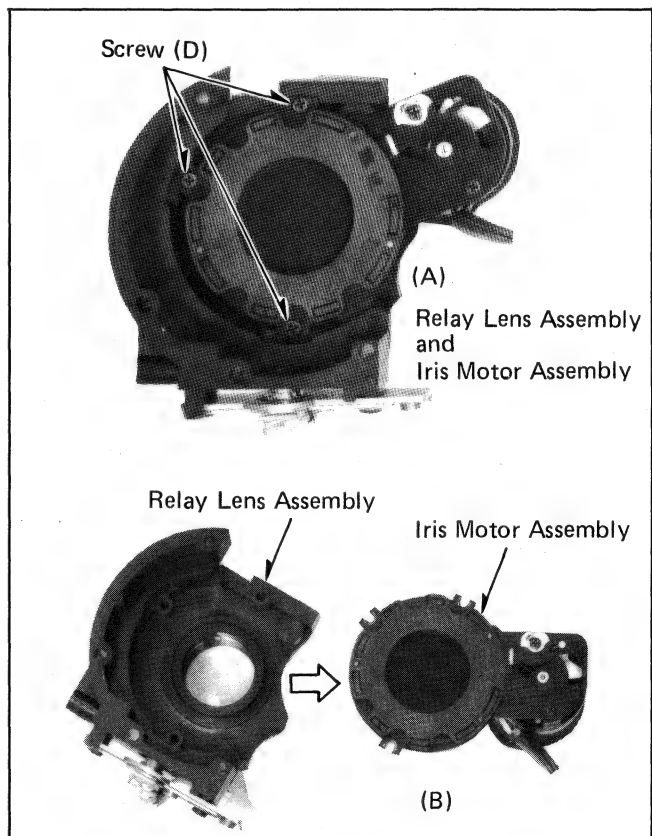


Fig. 25

TEST EQUIPMENT/TOOL LIST

1. Light Box w/Chart

	Part Number
Light Box w/Chart Set . . .	VFKS002
Gray Scale Chart	VFKS002A
Color Chart	VFKS002B
Registration Chart	VFKS002C
Resolution Chart	VFKS002D
Light Box	VFKS002Y

Reflection Chart

	Part Number
Reflection Chart Set . . .	VFKS003
Gray Scale Chart	VFKS003A
Color Chart	VFKS003B
Registration Chart	VFKS003C
Resolution Chart	VFKS003D
Color Sheet	VFKS003E

2. 3200° K Studio Light (See your local photo supply dealer):
Minimum requirement is 2 flood lights about 350-500 watts each.

3. Luxmeter

We recommend one of the following:

- A. Portable luxmeter Model No. 3281 by Yokogawa
Yokogawa Corporation of America
2 Dart Road Shenandoah, GA 30265
- B. Electronic Foot Candle Meter by Panlux
Berkey Marketing Company
25-30 Brooklyn Queens Expressway Woodside,
New York 11377

4. FM Detector

Part No. ----- VFKS001C

5. Oscilloscope

Dual Trace, 25MHz, 2mV/DIV.
Minimum Sensitivity with Delay Mode.

6. Vector Scope

7. VTVM or Digital Voltmeter

8. Tripod

9. Frequency Counter

10. Hex Wrench (1.5mm).

Electrical Adjustment Procedures

[1]-(A) +9V ADJUSTMENT

Cautions:

Adjust the voltage to +9 volts. This adjustment should always be performed before any other camera adjustments as voltage adjustment will affect overall camera adjustment. Unless complete camera alignment is to be performed, it is not necessary to adjust the voltage if the error is less than ± 0.02 volts.

1. To Adjust the voltage to +9 volts, connect a voltmeter to the +9 volt regulator at test point TP610 on the deflection circuit board.
2. Adjust +9V control VR626 so that the voltmeter indicates +9 volts ± 0.02 volts.

Preparations:

To achieve the best adjustment results, warm up the camera for approximately 30 minutes before adjusting.

To prevent short-circuits between the camera body and the undersides of the process and deflection circuit boards, place insulating tape on those portions of the circuit boards that may come in contact with the camera body.

Note:

All board drawings and adjustments are referenced to the foil side of the printed circuit board.

[1]-(C) +7.5V ADJUSTMENT

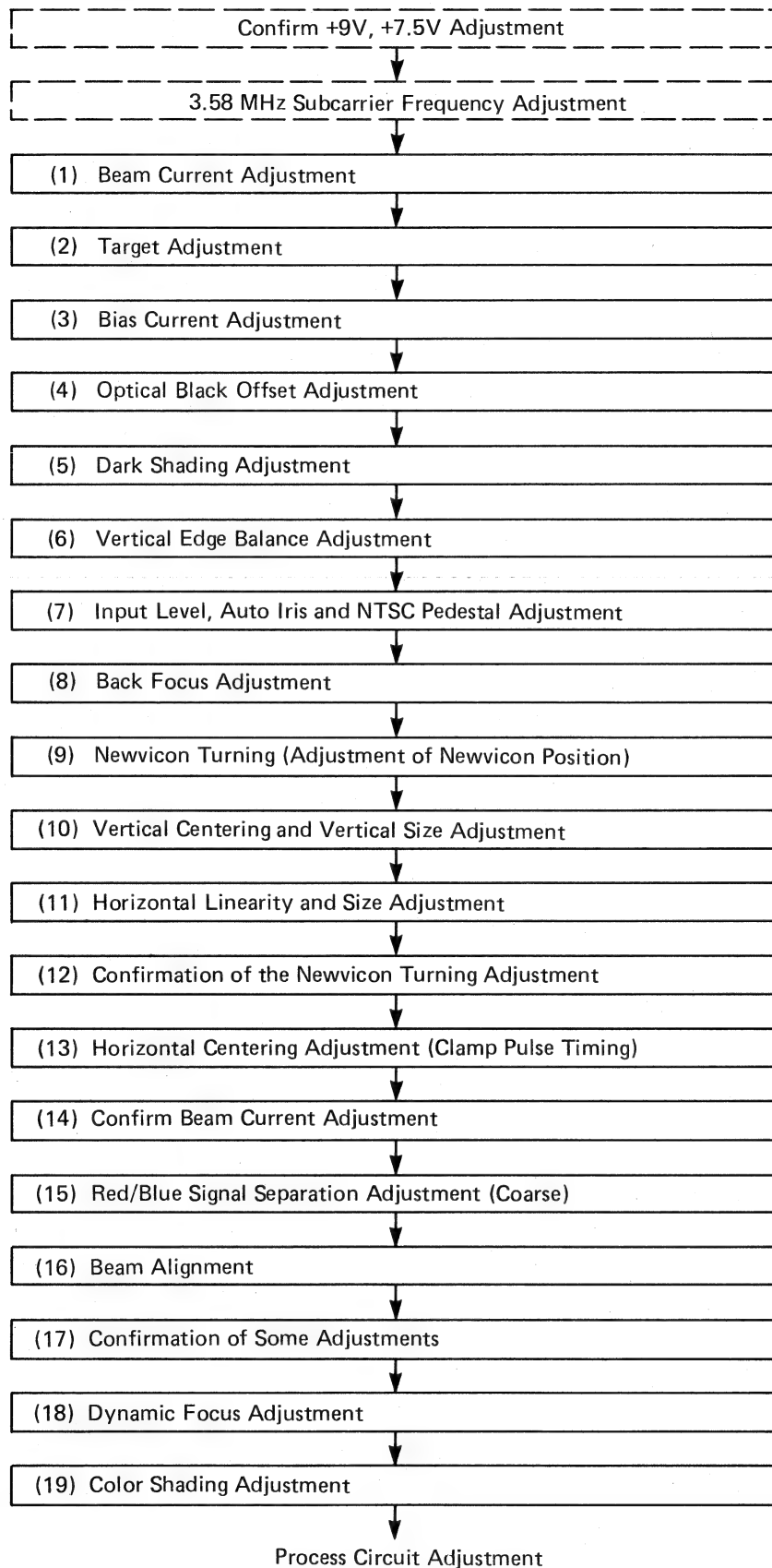
Cautions:

Adjust the voltage to +7.5 volts. This adjustment should always be performed before any camera's E.V.F. adjustments as voltage adjustment will affect overall camera's E.V.F. adjustment.

1. To adjust the voltage to +7.5 volts, connect a voltmeter to test point TP608 on the deflection circuit board.
2. Adjust +7.5V control VR622 so that the voltmeter indicates +7.5 volts.

(2) DEFLECTION CIRCUIT ADJUSTMENT

ADJUSTMENT FLOW CHART OF DEFLECTION CIRCUIT (BOARD)



Preparation:

1. Preset the following.
 - a. Color Temperature Correction Switch
—— Indoor position (mark : lamp)
 - b. Standby Switch
—— Operate position
 - c. Automatic White Balance Switch
—— Fixed position
2. Release the Dynamic Focus.

Note:

For this procedure, use test point TP607 as the external trigger for the vertical adjustment, and test point TP606 as the external trigger for the horizontal adjustment. This will ensure the flattest response.

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP604	BR602-1 BR602-2 BR602-3 BR602-4	/	Scope	TP606 HSS TP607 VSS

- a. First, cap the lens, then observe the signal at the horizontal rate at test point TP604.
- b. Trigger the oscilloscope with test point TP606.
- c. Adjust the horizontal sawtooth control BR602-1 and the horizontal parabola control BR602-2 so that the signal waveform is flattest during the horizontal period as shown in Fig. 1.

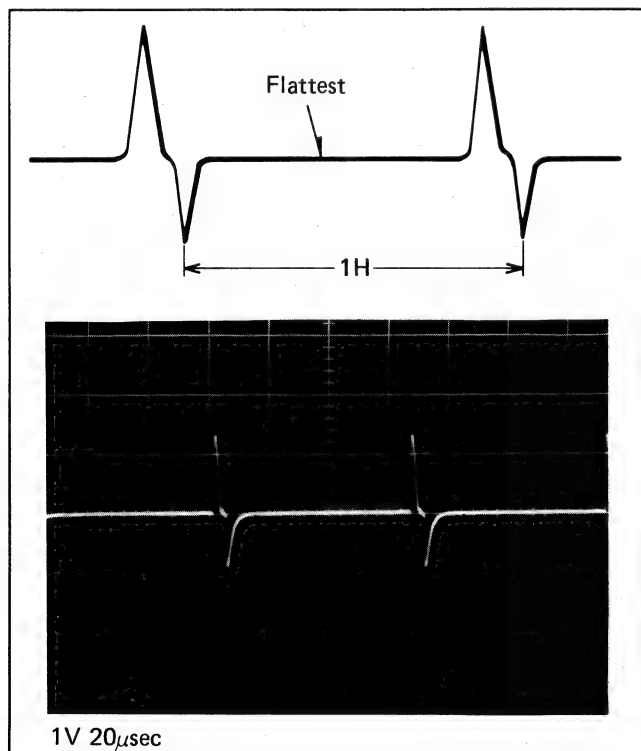


Fig. 1

- d. Now, observe the signal at the vertical rate at test point TP604, and adjust the vertical parabola control BR602-3 and the vertical sawtooth control BR602-4 so that the signal waveform is flattest during the vertical period as shown in Fig. 2.
Trigger the oscilloscope with test point TP607.

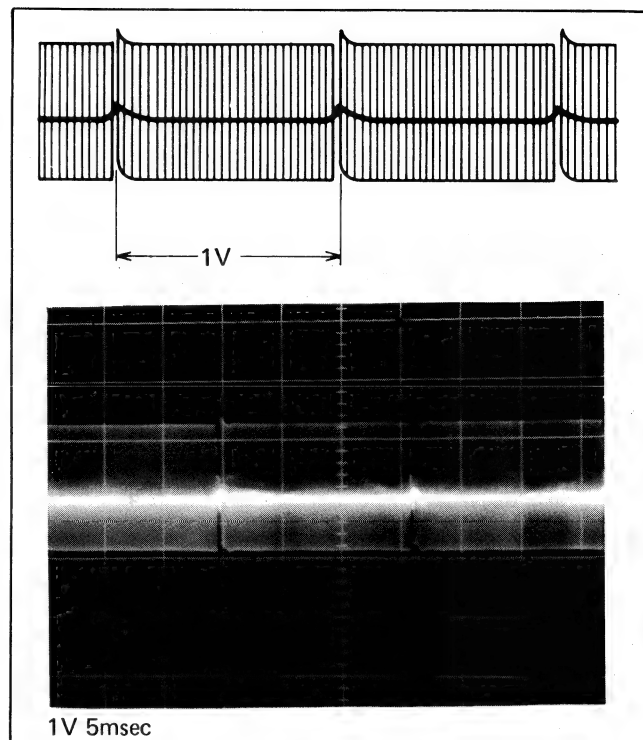


Fig. 2

3. Release the color shading.
Turn VR613, VR614, VR615, VR616, VR617 and VR618 to the center position as shown in Fig. 3.

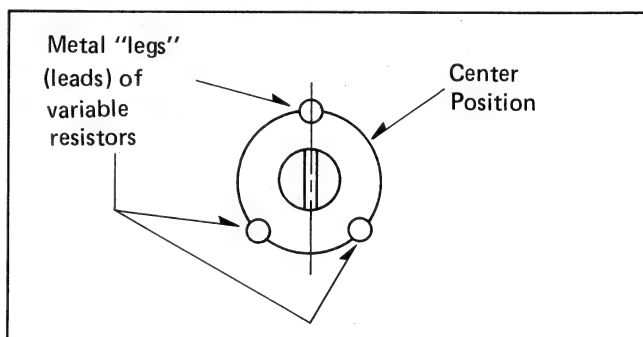


Fig. 3

4. Release the high luminance chroma clip circuit.
Turn VR307 fully counterclockwise from the foil side of the circuit board.

5. Adjust the 3.58MHz Sub-Carrier Frequency.

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP312	C358	/	Frequency Counter	/

- a. Measure the sub-carrier frequency at TP312.
- b. Adjust capacitor C358 so that the frequency counter indicates 3.579545MHz \pm 50Hz.

(1) BEAM CURRENT ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP301 TP605 TP613	VR607	White Light Box	Scope	TP606 HSS

1. Aim the camera at the far left edge of a light box or other small light source in order to saturate the beam (waveform does not increase).
2. Connect the oscilloscope to test point TP301 and observe the signal at the horizontal rate.
3. Connect a 33 μ /10V capacitor between TP605 and TP613 to stop the ABO circuit function.
Trigger the scope using TP606.

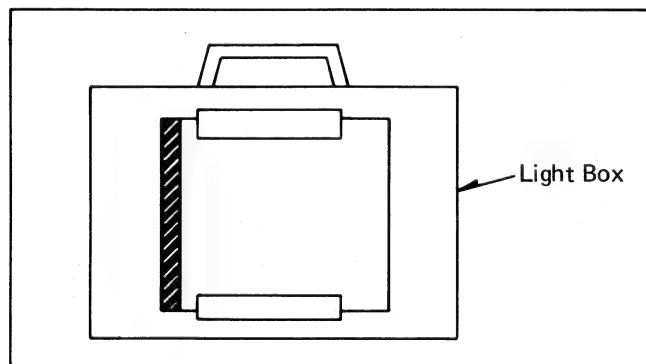


Fig. 4

Note:

Use a low ambient room light when performing this procedure. If lighting is too high, then close the iris manually.

4. Adjust the beam control VR607 so that signal clipping occurs at 0.9 volts peak-to-peak. (See Fig. 5.)

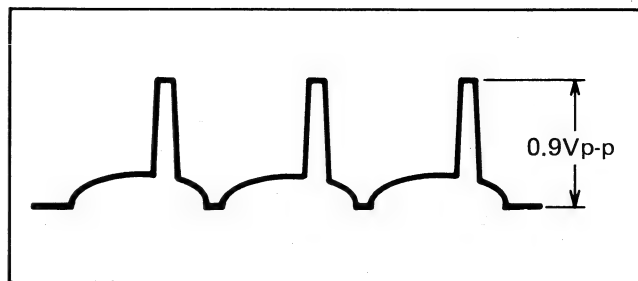


Fig. 5

If the signal is less than 0.9V peak-to-peak, use a more intense light source.

Be careful not to damage the pick-up tube with too strong a light.

5. Disconnect the 30 μ /10V capacitor.

(2) TARGET ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP601	VR601	/	Voltmeter	/

Note:

Before making any adjustments, wait 5 seconds after closing the lens to allow the dark current to stabilize.

1. Cap the lens.
2. Connect the voltmeter to test point TP601 on the deflection circuit board.
3. Wait 5 seconds after closing the lens to allow the dark current to stabilize.
4. Now adjust the target control VR601 so that the voltage at TP601 is equal to the Esj value stamped on the Newvicon neck plus 1V.
(Voltage at TP601 = Esj value +1V)

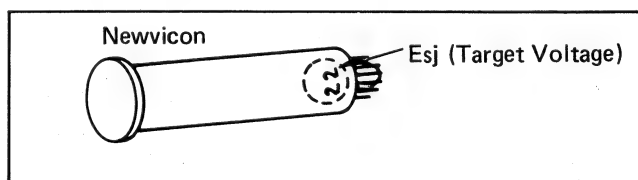


Fig. 6

(3) BIAS CURRENT ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP301	VR608	/	Scope	TP607 VSS

1. Cap the lens.
2. Connect the oscilloscope to test point TP301 and observe the signal at the vertical rate.
Trigger the oscilloscope with test point TP607.
3. Adjust VR608 so that the waveform level is 20mVp-p.

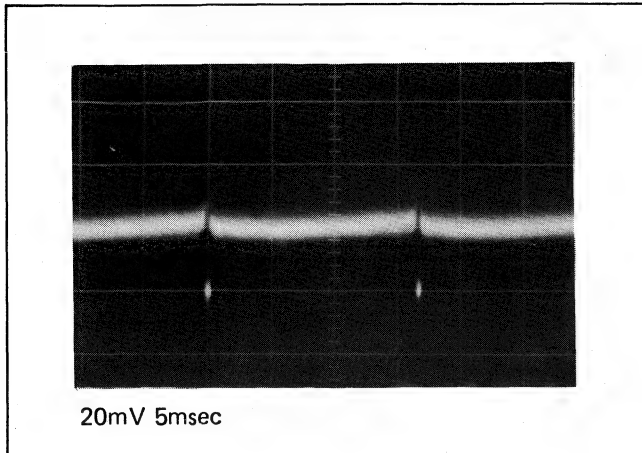


Fig. 7

(4) OPTICAL BLACK OFFSET ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP303	VR304	/	Scope	TP607 VSS

Note:

Before starting this adjustment, cap the lens, and wait 10 seconds.

1. Connect the oscilloscope to test point TP303 and observe the signal at the vertical rate. Trigger the oscilloscope with test point TP607.
2. Adjust the optical black offset control VR304 so that the waveform level is about 0mVp-p. (Use center of carrier leakage.)

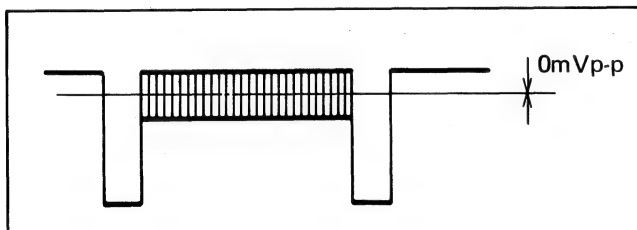


Fig. 8

(5) DARK SHADING ADJUSTMENT

Note:

Before starting this adjustment, cap the lens and wait 10 seconds.

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP303	BR601-1 BR601-2 BR601-3 BR601-4	/	Scope	TP607 VSS TP606 HSS

1. Connect the oscilloscope to test point TP303 and observe the signal at the vertical rate. Trigger the oscilloscope with test point TP607.
2. Adjust the dark shading control (V. Para.), BR601-3 and the dark shading control (V. Saw.), BR601-4 so that the signal waveform is flattest during the vertical period as shown in Fig. 9.

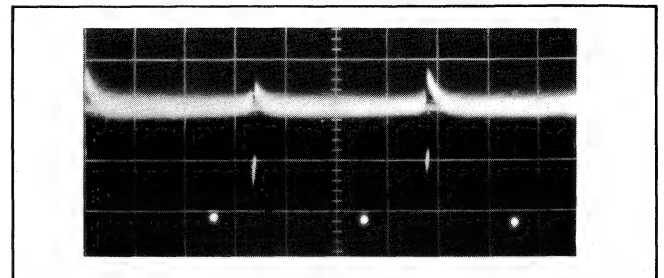


Fig. 9

3. Now, observe the signal at the horizontal rate at test point TP303, and adjust the dark shading control (H. Saw.), BR601-1 and the dark shading control (H. Para.), BR601-2 so that the signal waveform is flattest during the horizontal period as shown in Fig. 10. Trigger the oscilloscope with test point TP606.

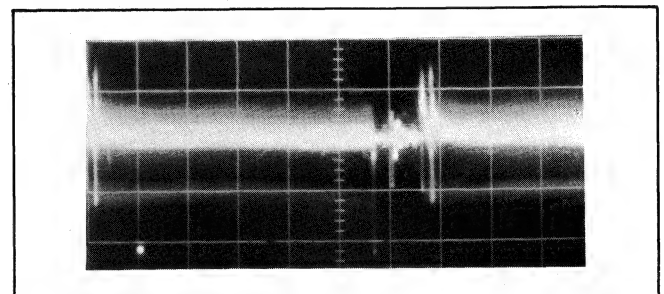


Fig. 10

4. Check the optical black offset adjustment and, if necessary, readjust the optical black offset control VR304.

(6) VERTICAL EDGE BALANCE ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP314 YL Signal TP313 V-Edge Correction Signal	VR318 Bias Control VR319 V-Edge Balance	Gray Scale	Scope	TP606 HSS TP607 VSS

1. Aim the camera at the gray scale chart.
2. Connect the oscilloscope to test point TP314 and observe the signal at the horizontal rate. Trigger the oscilloscope with test point TP606.

- Adjust the bias control, VR318, so that the YL signal is maximized, as shown in Fig. 11.

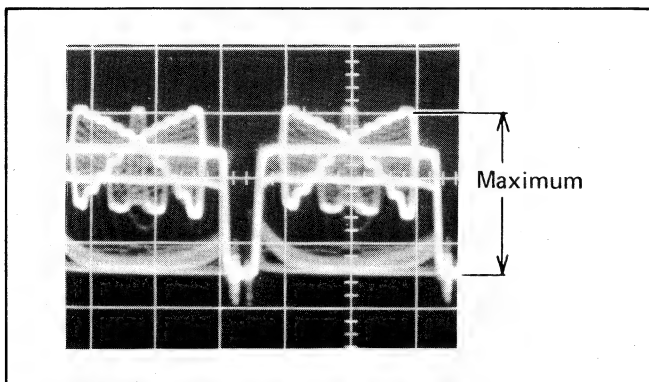


Fig. 11

- Then, connect the oscilloscope to test point TP313 and observe the vertical edge correction signal at the vertical rate.
Trigger the oscilloscope with test point TP607.
- Adjust the vertical edge balance control VR319 so that the vertical edge correction signal is minimized, as shown in Fig. 12.

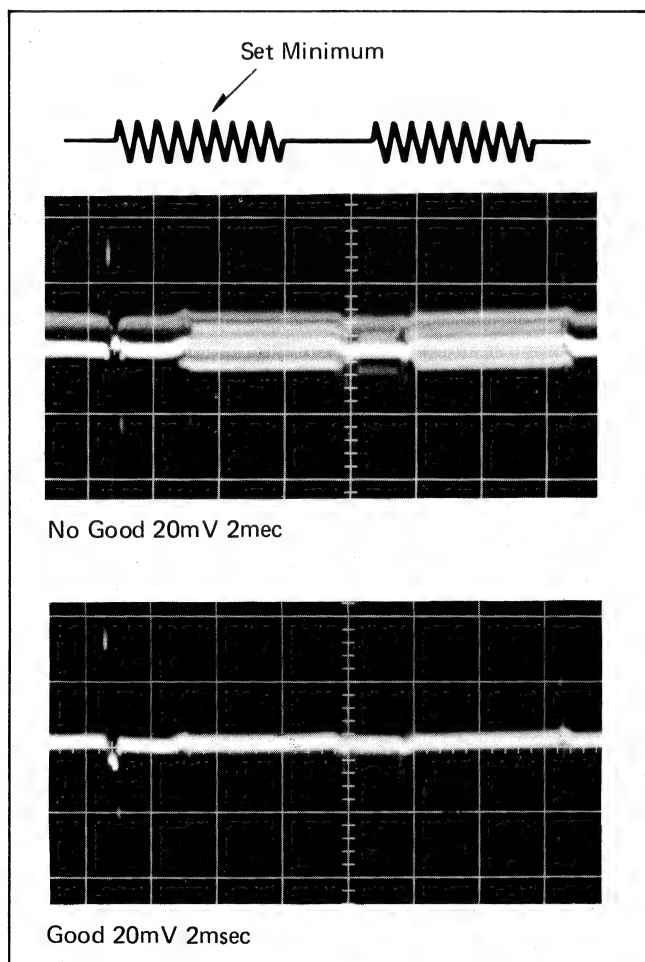


Fig. 12 Vertical Edge Correction Signal at TP311

(7) INPUT LEVEL, AUTO IRIS AND NTSC PEDESTAL ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP301 TP302 TP317	VR302 VR321 VR307 VR6001	Gray Scale	Scope	TP606 HSS

Note:

If a reflection type gray scale chart is used, a light intensity of between 1,400 and 2,000 lux will be required.

- Aim the camera at the gray scale chart.
- Connect the oscilloscope to test point TP301 and observe the signal at the horizontal rate.
Trigger the oscilloscope with test point TP606.
- Then to release the carrier signal, turn focus control VR6001 fully clockwise (from foil side of the board).
- Adjust VR301 to 400mVp-p.

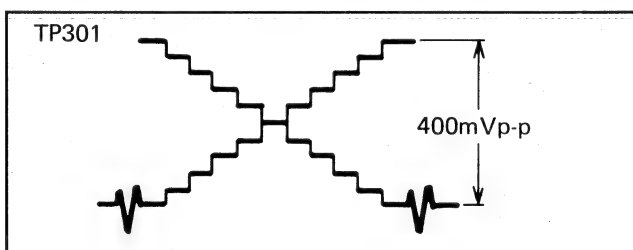


Fig. 13

- Connect the oscilloscope to test point TP302 and observe the signal at the horizontal rate.
- Adjust the focus control VR6001 so that the signal level is maximized.
- Then, cap the lens.
- Connect the oscilloscope to test point TP317 and observe the NTSC signal.
- Adjust VR321 to 50 (+20, -10)Vp-p.

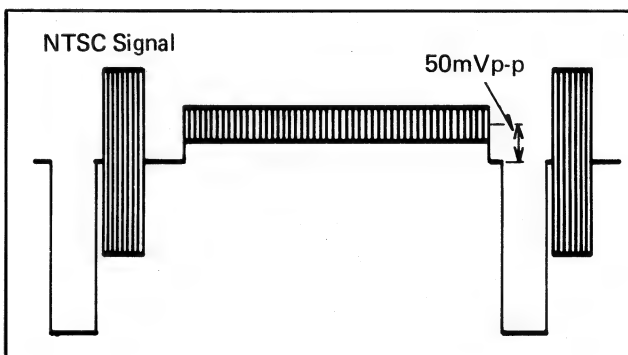


Fig. 14

- Aim the camera at the gray scale chart.
- Now, observe the NTSC signal at the horizontal rate at test point TP317.

12. Turn VR307 fully counterclockwise position, to reduce the carrier signal.
13. Adjust VR302 to 0.7Vp-p.
14. Turn VR307 fully clockwise.
15. Confirm that signal at TP301 is 400mVp-p.
If it is not then readjust.

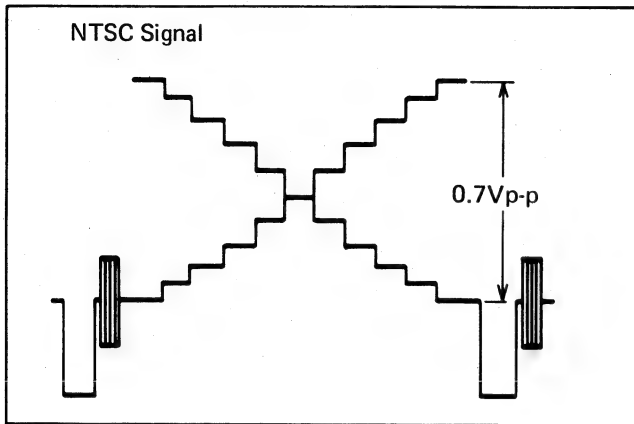


Fig. 15

(8) BACK FOCUS ADJUSTMENT

1. Aim the camera at an object more than 10 meters (33 feet) away, and zoom all the way in (maximum close up).
2. Focus the lens on the object.
3. Loosen the hex screw using a 1.5mm hex wrench on the relay lens.
(See Fig. 16)

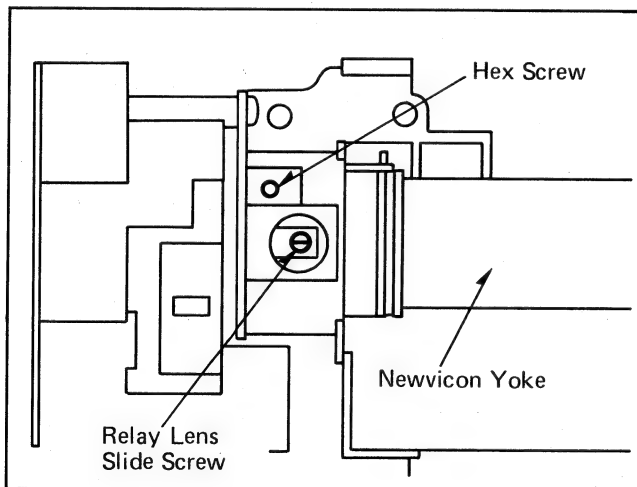


Fig. 16 Deflection Yoke View

4. Zoom all the way back and adjust the relay lens slide screw until the sharpest focus is obtained.
5. Repeat this procedure--zoom in, focus, zoom out, and adjust--until the best focus is obtained over the entire zoom range.

6. Tighten the hex screw using a 1.5mm hex wrench on the relay lens.
Do not overtighten the hex screw.
You may crack the lens assembly or the lens housing.

(9) NEWVICON TURNING (ADJUSTMENT OF NEWVICON POSITION)

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP302	VR6001 Newvicon Turning	White	Scope	TP607 VSS

1. Aim the camera at a white chart or white screen and focus the lens.
2. Connect the oscilloscope to test point TP302 and observe the signal at the vertical rate.
Trigger the oscilloscope with test point TP607.
3. Adjust Focus Control VR6001 for maximum signal level as shown in Fig. 17.

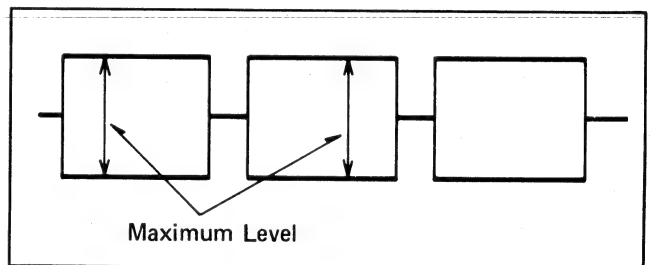


Fig. 17

4. Delay the sweep of the center portion of the vertical signal waveform and observe a few horizontal lines.
5. Loosen the newvicon clamp screw on the deflection yoke assembly as shown in Fig. 18.

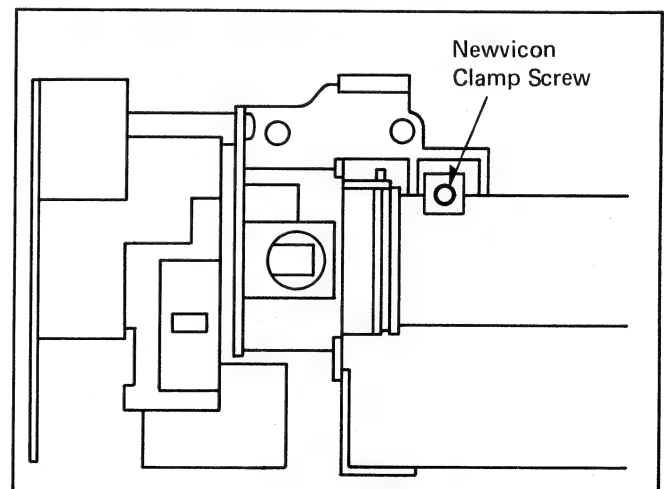


Fig. 18 Deflection Yoke View

6. Now rotate the pick-up tube socket so that the waveform for each horizontal scan line is free from beat and ripple.
Do not worry about differences in amplitude.

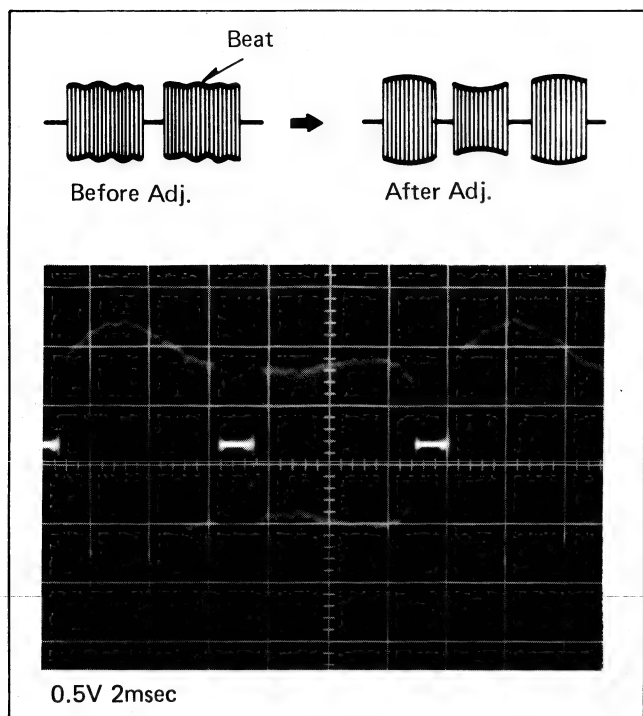


Fig. 19 Waveform of Proper Newvicon Turning

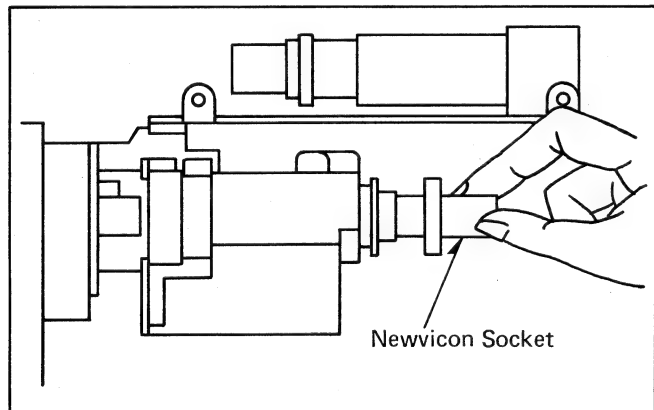


Fig. 20

Note:

Be careful not to touch the connector on the newvicon. The high voltage at the connector may give you a severe shock and perhaps damage the newvicon.

7. Finally, tighten the newvicon clamp screw.

(10) VERTICAL CENTERING AND VERTICAL SIZE ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP302 3.58MHz Carrier	VR602 V. Size VR603 V. Cent.	White	Scope	TP607 VSS

1. Aim the camera at a white chart.
2. Connect the oscilloscope to test point TP302 and observe the vertical interval of the 3.58MHz carrier signal. Trigger the oscilloscope with test point TP607.
3. Adjust the vertical size control, VR602, so that the beat in the signal is minimized. These beats will appear if the vertical size is not properly adjusted. Properly adjusted, there should be a maximum of one beat per envelope.

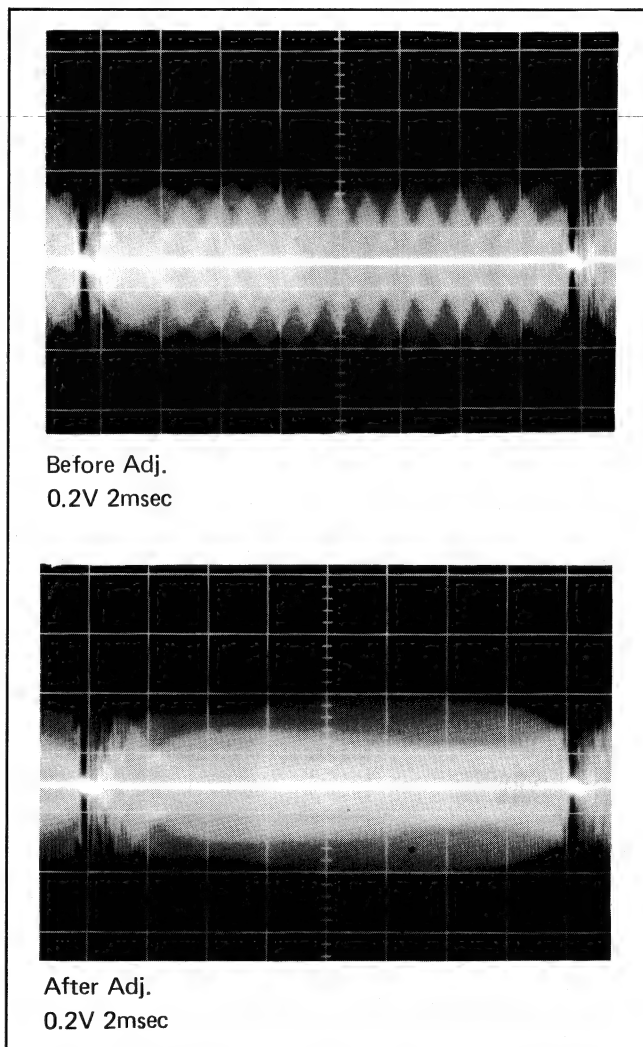


Fig. 21

4. Now aim the camera at a small object so that the object is in the center of the monitor screen.
5. Adjust the vertical center control, VR603, so that the small object does not shift vertically as you zoom in and out.

(11) HORIZONTAL LINEARITY AND SIZE ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP302 3.58MHz Carrier Composite Blanking	VR619 H. Size VR621 H. Lin. (1) L601 H. Lin. (2)	White	Scope FM Detector	TP606 HSS

1. Aim the camera at a white chart or white screen.
2. Check the focus adjustment and, if necessary, readjust Focus Control VR6001.
3. Turn the FM detector knob to the Horizontal Size and Linearity position.
4. Turn the switch on the rear panel to the 3.58MHz position.

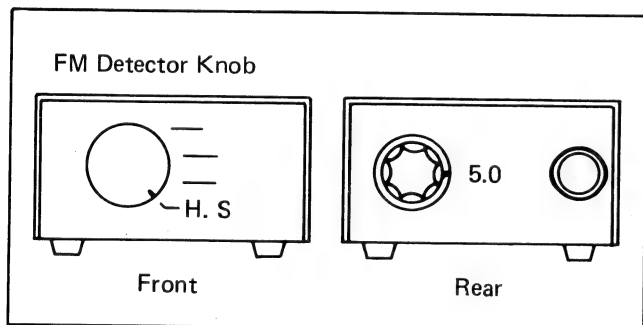


Fig. 22 FM Detector

5. Connect the FM detector input to test point TP302, and connect the FM detector output to the oscilloscope input. Connect the FM detector blanking to test point TP308. Connect the FM detector +9V line to test point TP610. Connect the FM detector ground to the camera ground.

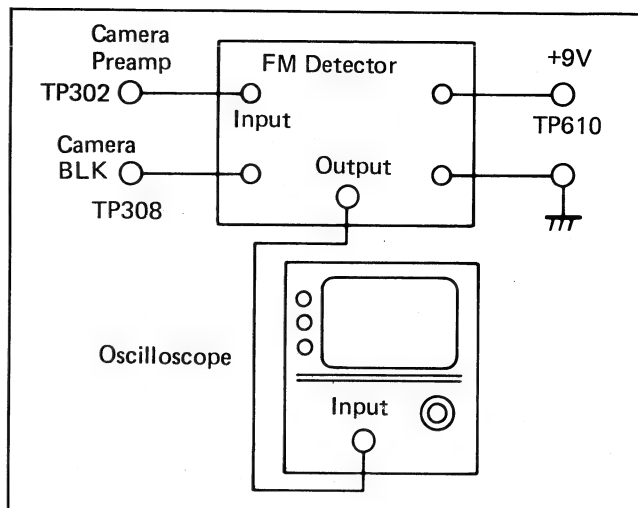


Fig. 23 Connection of FM Detector

6. Now, adjust the horizontal size control VR619, so that the signal is centered on the blanking line, as shown in Fig. 24. Trigger the oscilloscope with test point TP607.

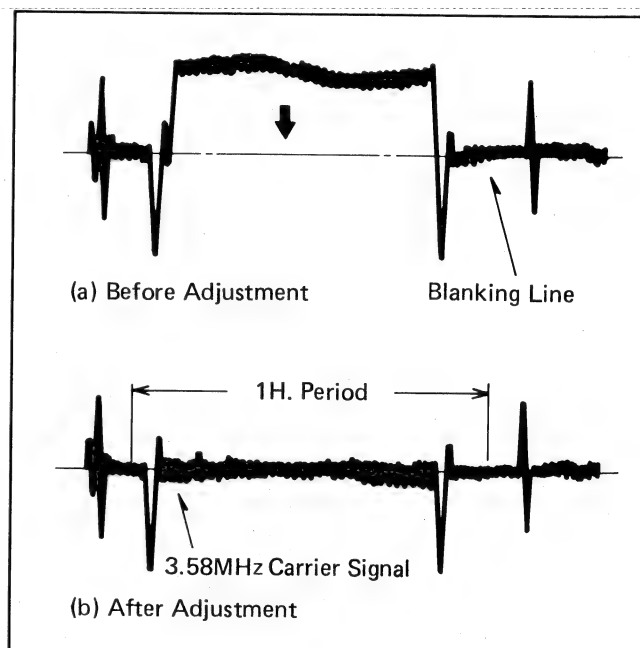


Fig. 24 Waveform of Proper Adjustment

7. Finally, adjust the horizontal linearity 1 control VR621, and the horizontal linearity 2 control, L601, so that the waveform on the oscilloscope is as flat as possible. Horizontal Linearity 1 controls the horizontal sweep for the left side of the picture, while Horizontal Linearity 2 controls the overall linearity.

(12) CONFIRMATION OF THE NEWVICON TURNING ADJUSTMENT

Check the newvicon turning adjustment and adjust it if necessary. If the adjustment is correct, go on to the next procedure, step (13).

(13) HORIZONTAL CENTERING ADJUSTMENT (Clamp Pulse Timing)

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP301 Preamp Output TP309 CP1	VR620 H. Cent.	White	Scope	TP606 HSS

1. Aim the camera at a white chart.
2. Next, connect an oscilloscope probe to test point TP301 and observe the horizontal blanking interval of the signal.

Trigger the oscilloscope with test point TP606.

3. Connect the other oscilloscope probe to the clamp pulse 1 (CP1) test point, TP309.
4. Set the oscilloscope in the delay mode.
5. Adjust the horizontal centering control, VR620, so that the time between the trailing edge of the video signal, in other words, the front porch of the optical black, and the leading edge of the clamp pulse 1 signal (TP309) is 1.5 sec. as shown in Fig. 25.

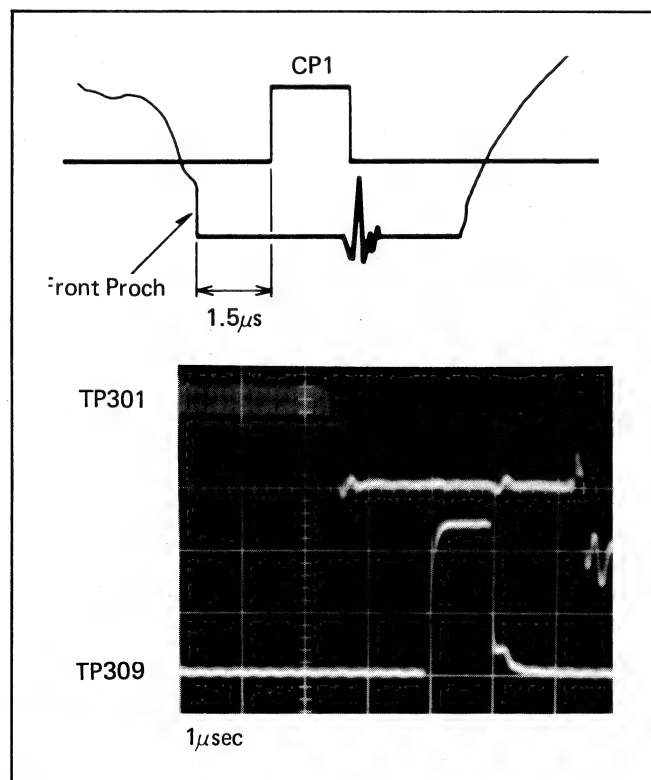


Fig. 25 Waveform for H. Cent.
(H. Blanking Signal at TP301 and CP1)

Note:

With some newvicons, the oscilloscope display will show a double trace at the end of a horizontal line. If this should occur, reconfirm the newvicon turning adjustment. If the newvicon adjustment is correct, adjust the horizontal centering control VR620 so that the time between the trailing edge (a) of the video signal and the leading edge of the clamp pulse 1 signal is 1.5 sec.

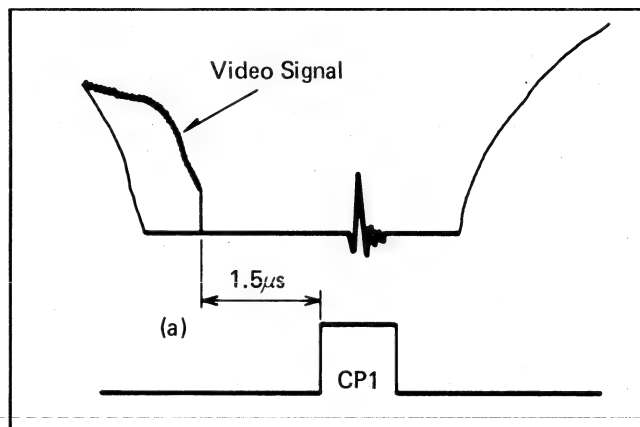


Fig. 26

(14) CONFIRM BEAM CURRENT ADJUSTMENT

If the target adjustment is made, check and readjust the beam current (step 1) if necessary.

If the adjustment is correct, go on to the next procedure, step (15).

(15) RED/BLUE SIGNAL SEPARATION ADJUSTMENT (COARSE)

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP305 Blue Signal	VR305 VR309 VR303 VR320	Gray Scale	Scope	TP606 HSS

1. Aim the camera at the gray scale chart.
2. Connect the oscilloscope to test point TP305 observe the blue signal.
3. Alternately adjust the two Red & Blue separation controls, VR305 and VR309 to minimize the flicker.
4. Aim the camera at a white chart.
5. Set the WB switch to the "AUTO" position.
6. Then, alternately adjust VR303 and VR320 so that the white area of TV monitor is maximized.

(16) BEAM ALIGNMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP315	Two Alignment Rings VR320 VR6001	White	Color Monitor Scope	TP606 HSS

1. Aim the camera at an evenly illuminated white surface (use 1,500 lux or light box) and focus the lens.
2. Adjust VR320 so that the TV monitor picture is red-dish.
3. And adjust the focus control VR6001, so that the magenta area in the monitor picture is maximized and the green area is minimized.
4. Cut the lock paint on the alignment rings before attempting to rotate the rings.
5. Aim the camera at a white chart or white screen.

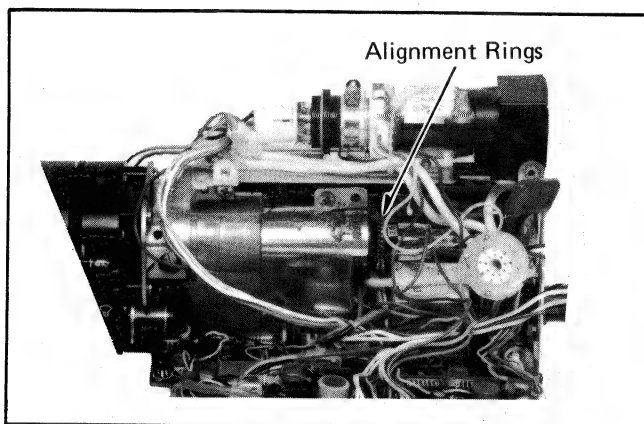


Fig. 27

6. Connect the oscilloscope to test point TP315 and observe the R-Y signal at the horizontal rate. Trigger the oscilloscope with test point TP606.
7. Observe the raster on the TV monitor, and adjust the two alignment rings (See Fig. 27.) so that the signal level is minimized and the magenta color covers the whole screen as shown in Fig. 28.

Note :

You may observe discoloration at the edges and corners.

Disregard this as the Dynamic Focus adjustment procedure will clean this up.

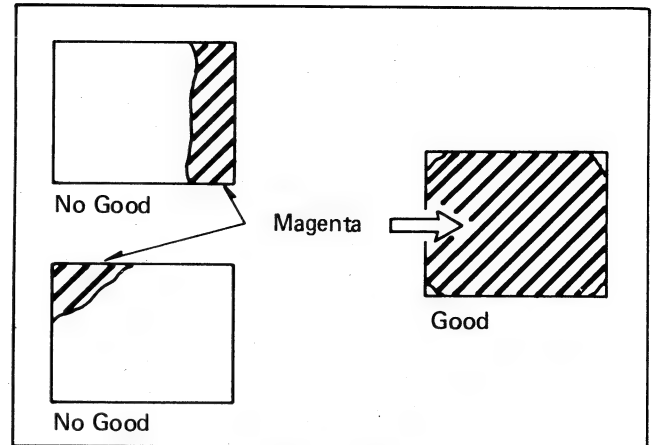


Fig. 28 TV Screen

8. Paint-lock the alignment rings with either white paint or lacquer.

(17) CONFIRMATION OF SOME ADJUSTMENTS

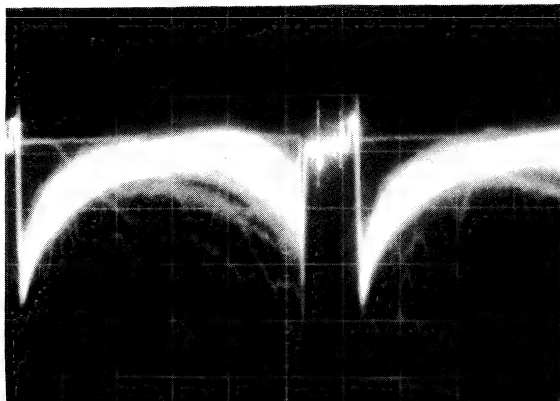
Check some items as shown below.

1. Vertical Centering and Size adjustment (step 10).
2. Horizontal Centering and Size adjustment (step 11, 13).
3. Dark Shading adjustment (step 5).

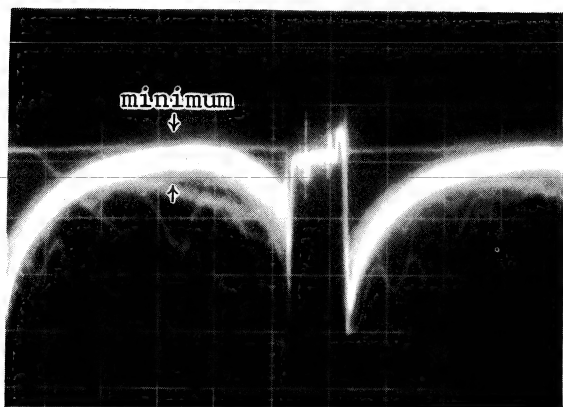
(18) DYNAMIC FOCUS ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP315 R-Y Signal	BR602-1 H. Saw. BR602-2 H. Para. BR602-3 V. Para. BR602-4 V. Saw.	White	Scope Color Monitor	TP606 HSS

1. Aim the camera at a white chart.
2. Observe the color monitor and adjust the focus control, VR6001, so that the center area of monitor shows a red (magenta) color (minimize green color), if necessary.
3. Connect the oscilloscope to test point TP315 and observe the R-Y signal at the horizontal rate. Trigger the oscilloscope with test point TP606.
4. Alternately adjust vertical parabola control, BR602-3 and vertical sawtooth control, BR602-4 so that the signal level is minimized as shown in Fig. 29.



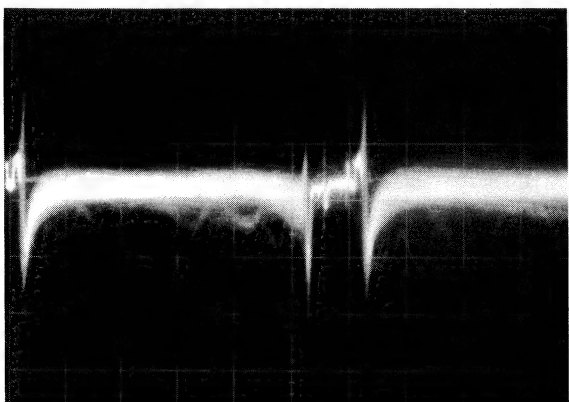
Before Adj.
100mV 10 μ sec
V. rate



After Adj.
100mV 10 μ sec
V. rate

Fig. 29 Waveform of TP315

5. Then, alternately adjust horizontal sawtooth control, BR602-1 and horizontal parabola control, BR602-2 for the signal waveform to be flattest during the horizontal period as shown in Fig. 30.



100mV 10 μ sec
H. rate

Fig. 30 Waveform of TP315

6. Check the color TV monitor for green tinting in the corners and at the sides. In most cases, the green tinting will be eliminated by these adjustments.
7. If, however, there is still some green tinting present, fine-adjust the alignment rings on the newvicon until the green tinting is completely eliminated.

(19) COLOR SHADING ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP315 R-Y Signal	VR615 VR613 VR614	White	Scope Color Monitor	TP606 HSS
TP316 B-Y Signal	VR618 VR616 VR617			

1. Aim the camera at a white chart of a light box. If a reflection chart is used, a light intensity of about 4,000 lux will be required.
2. Connect the oscilloscope to test point TP315 and observe the R-Y signal at the horizontal rate. Trigger the oscilloscope with test point TP606.
3. Adjust VR615 so that the signal level is minimized as shown in Fig. 31.



100mV 10 μ sec
V. rate

Fig. 31 Waveform of TP315

4. Then, alternately adjust VR613 and VR614 for the signal waveform to be flattest during the horizontal period as shown in Fig. 32.

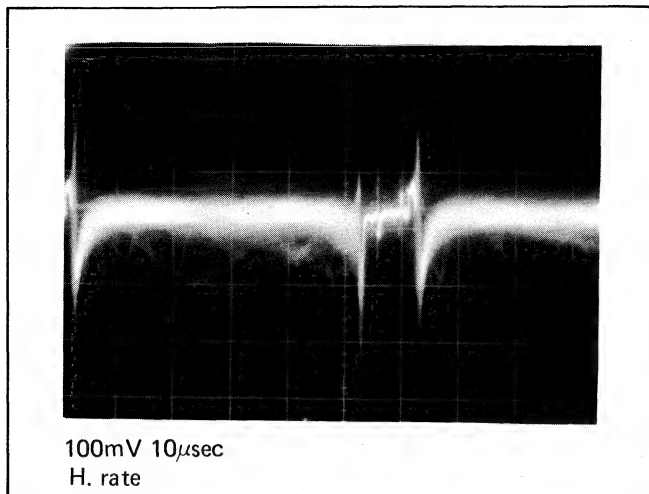


Fig. 32 Waveform of TP315

5. Now connect the oscilloscope to test point TP316 and observe the B-Y signal at the horizontal rate. Trigger the oscilloscope with test point TP606.
6. Adjust VR618 so that the signal level is minimized.

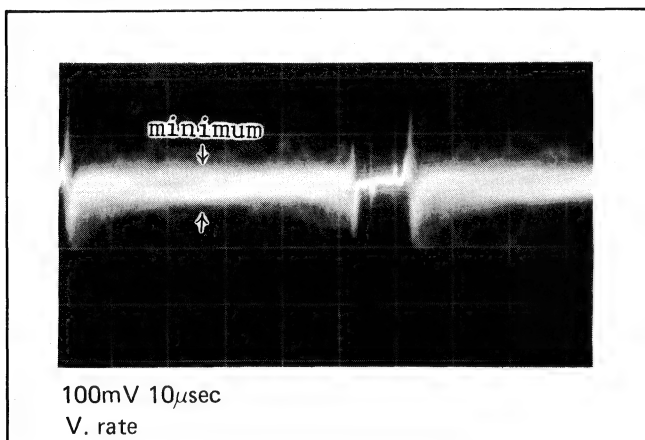


Fig. 33 Waveform of TP316

7. Then, alternately adjust VR616 and VR617 for the signal waveform to be flattest during the horizontal period, as shown in Fig. 34.

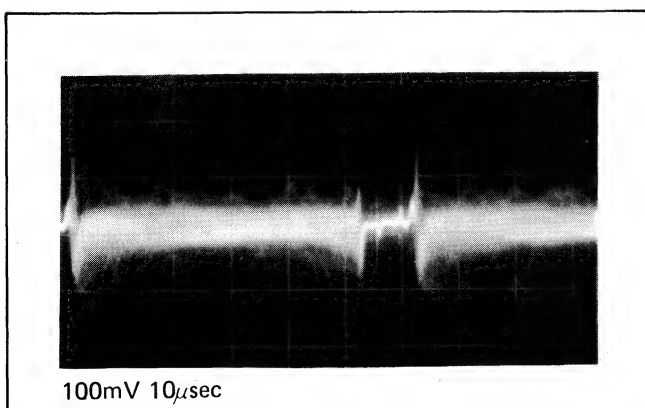
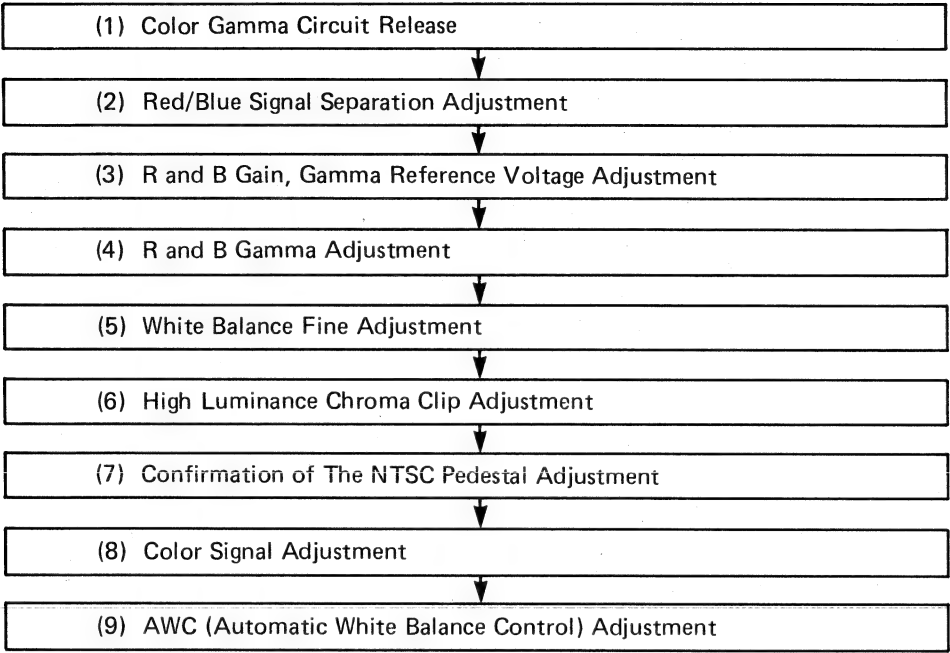


Fig. 34 Waveform of TP316

[3] PROCESS CIRCUIT ADJUSTMENT

ADJUSTMENT FLOW CHART FOR PROCESS CIRCUIT



Preparation:

The process circuit requires several preadjustments before any actual adjustments can be made.

- a. Set the color temperature correction switch to the indoor position (mark : lamp)
- b. Set the automatic white balance switch to the "Fixed" position.
- c. Finally, set the standby switch to the operate position.

A test pattern light box will be required for several of the adjustment procedures.

Be sure that the AC voltage (115~125V) for the light box is correct and that you are using the correct pattern for each procedure.

If the reflection chart is used, the following light condition is required.

Color Temperature: 3,200°K
Light Intensity 1,400~ 2,000 lux
(on the chart surface)
Make sure that the correct pattern is used for each step.

(1) COLOR GAMMA CIRCUIT RELEASE

Turn VR310, VR311, VR312, VR313, VR314 and VR315 to the center position as shown in Fig. 35.

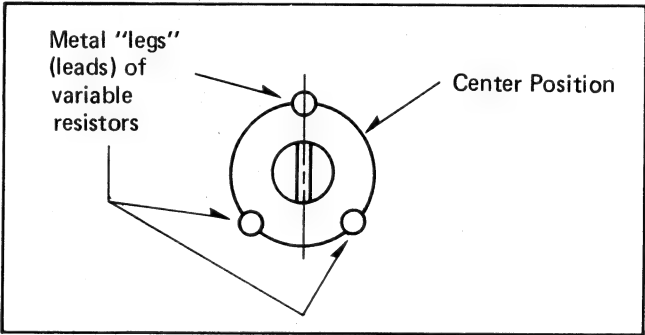


Fig. 35

Note:
Adjust each potentiometer from the foil side of circuit board.

(2) RED/BLUE SIGNAL SEPARATION ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP305 Blue Signal	VR305 VR309	Gray Scale	Scope	TP606 HSS

- 1. Aim the camera at the gray scale chart.
- 2. Connect the oscilloscope to test point TP305 and observe the blue signal.
Trigger the oscilloscope with test point TP606.
- 3. Alternately adjust the two red & blue separation controls, VR305 and VR309 to minimize the flicker.

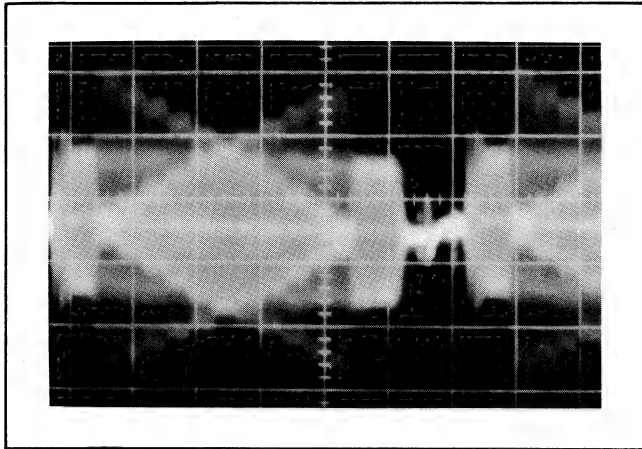


Fig. 36 Blue Signal

4. If the blue signal from test point TP305 has red contamination, the waveform will be unstable and have changing amplitude.

(3) R AND B GAIN, GAMMA REFERENCE VOLTAGE ADJUSTMENT (WHITE BALANCE ADJUSTMENT)

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP317 NTSC Signal	VR303 VR320	Gray Scale	Scope	TP606 HSS

Note:

Before proceeding with this adjustment, preset the following camera controls.

- a. Set the color temperature correction switch to the indoor position (mark : lamp).
 - b. Set the automatic white balance switch to the "Auto" position.
1. Aim the camera at the gray scale chart.
 2. Connect the oscilloscope to test point TP317 and observe the NTSC signal at the horizontal rate. Trigger the oscilloscope with test point TP606.
 3. Alternately adjust the red gain control VR320 and the chroma gain control VR303, to minimize the carrier leakage at the fourth step through the eighth step from the bottom.

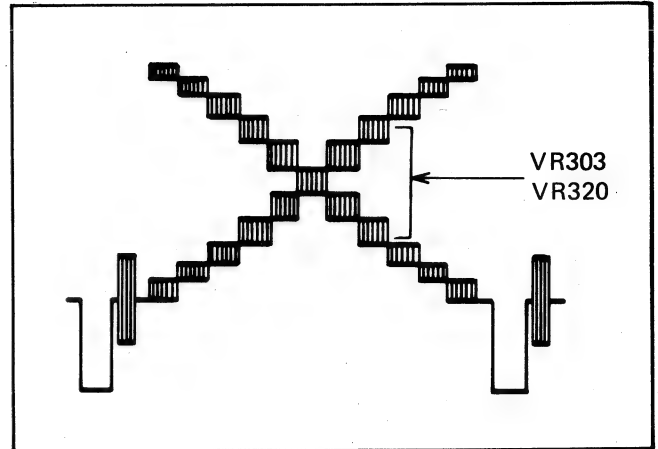


Fig. 37 NTSC Signal

(4) R AND B GAMMA ADJUSTMENT (WHITE BALANCE ADJUSTMENT)

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP317 NTSC Signal	VR315 R-Gamma 1 VR312 B-Gamma 1 VR314 R-Gamma 2 VR311 B-Gamma 2 VR313 R-Gamma 3 VR310 B-Gamma 3	Gray Scale	Scope	TP606 HSS

1. Aim the camera at the gray scale chart.
2. Connect the oscilloscope to test point TP317 and observe the NTSC signal at the horizontal rate. Trigger the oscilloscope with test point TP606.
3. Adjust Red Gamma 1 Control, VR315 and Blue Gamma 1 Control, VR312 until the carrier leakage from the bottom through third steps is minimized.
4. Alternately adjust the red gain control VR320, and the chroma gain control VR303, to minimize the carrier leakage at the fourth step through the eighth step from the bottom.
5. Adjust Red Gamma 2 Control VR314 and Blue Gamma 2 Control VR311, until the carrier leakage from third through fifth step from the top is minimized.
6. Zoom the lens out so that the black edge of the chart is visible in the picture. This increases the chart luminance which makes adjustment easier.
7. Then, adjust Red Gamma 3 Control VR313 and Blue Gamma 3 control VR310, until the carrier leakage from the first through third step from the top is minimized.

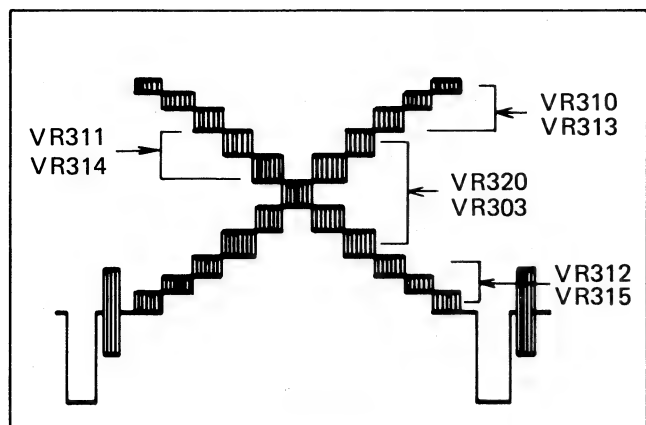


Fig. 38 NTSC Waveform

Note:

It is normal to have some residual carrier leakage, particularly at the top steps of the waveform.
It is normal condition that the level of minimized waveform is unstable depending on the characteristics of the newvicon.

High Luminance Parts Should Show no Color When Adjustment by VR307.

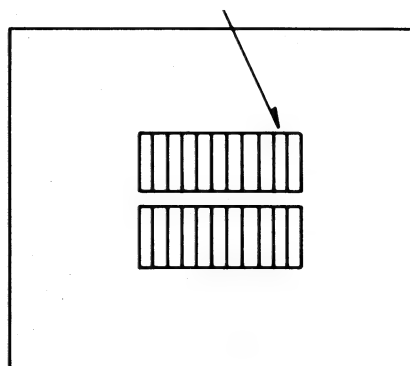


Fig. 39

(7) CONFIRMATION OF THE NTSC PEDESTAL ADJUSTMENT

Check NTSC pedestal adjustment and NTSC signal level adjustment, step (7)(See deflection circuit adjustment flow chart.), and adjust it if necessary.
If the adjustment is correct, go on to the next step.

(5) WHITE BALANCE FINE ADJUSTMENT

Repeat (3) R and B gain adjustment and (4) R and B gamma adjustment.

(6) HIGH LUMINANCE CHROMA CLIP ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
/	VR307 H. C. Gain	Gray Scale	Color Monitor	/

1. Aim the camera at the gray scale chart and observe the picture on the TV monitor.
2. Next, zoom out to 12mm and check the high luminance part of the scale, from the whitest step to the fourth step from white.
The picture should be whitish-gray.
3. If, however, the picture has a green or yellow cast, adjust the High Luminance Chroma Clip Gain Control VR307, until the cast is eliminated and the picture is a normal whitish-gray.

(8) COLOR SIGNAL ADJUSTMENT

TP	Adj.	Chart	Test Instrument	Scope Trigger
TP317 NTSC Signal	VR306 R-Y Gain VR308 BF Phase C326 B-Y Phase	Color Bar Chart	Vectorscope	/

1. Aim the camera at the color bar chart.
2. Connect the vectorscope to test point TP317.
3. Set the vectorscope to "Vector" mode and observe the color vector.
4. Adjust the R-Y gain control VR306 so that the amplitude of the red signal is 1.5 times the amplitude of the burst signal.
5. Adjust the burst frag phase control VR308, (BF phase), so that the vector phase of the red signal is $104^\circ \pm 15^\circ$.
6. Adjust the B-Y phase control C326 so that YL signal is $168^\circ +10^\circ -30^\circ$ as shown in chart-1.

Specification:

1) Phase

Signal	Vector Phase	Adj.
R	$104^{\circ} \pm 15^{\circ}$	VR331
YL	$168^{\circ} \begin{matrix} +10^{\circ} \\ -30^{\circ} \end{matrix}$	C348

2) Amplitude

- The amplitude of R signal is 1.5 times the burst signal.
- The amplitude of YL signal is 1.2 times the burst signal.

Chart-1.

(9) AWC (AUTOMATIC WHITE BALANCE CONTROL) ADJUSTMENT

- Aim the camera at a white chart.
- Set the Automatic White Balance Switch to "AUTO" position.
- Now, observe the vectorscope screen and alternately adjust the automatic white balance controls VR316 and VR317 so that the white balance point is in the center of the vectorscope screen.

[4] ELECTRONIC VIEWFINDER CIRCUIT

(1) HORIZONTAL FREQUENCY ADJUSTMENT

- Turn the power switch on.
- Aim the camera at the test pattern.
- Short pin-1 and pin-2 of connector P607 using a jumper.
- Connect the oscilloscope to test point TP612 and measure the voltage (V1) of TP612.
- Then, disconnect the jumper and adjust VR623 so that the oscilloscope indicates $V1 + 1.0 (+0.1, -0) V$.

(2) FOCUS

- Aim the camera at the registration chart.
- If the focus on viewfinder is improper but the picture on the monitor is OK, adjust VR6003.

(3) HORIZONTAL AND VERTICAL CENTERING ADJUSTMENT

- Aim the camera at the registration chart.
- Adjust the centering coil assembly so that the horizontal and vertical picture is proper condition.

(4) VERTICAL AMPLITUDE ADJUSTMENT

- Aim the camera at the gray scale chart.
- Adjust the vertical amplitude control VR625 as shown in Fig. 40.

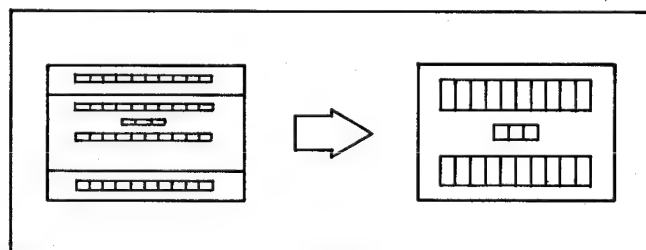


Fig. 40

(5) IRIS INDICATOR ADJUSTMENT

- Aim the camera at the gray scale chart. If a reflection type gray scale chart is used, a light intensity above 1,000 lux will be required on the chart surface.
- Adjust VR624 so that the iris indicator is in the center position.

(6) BLIGHT ADJUSTMENT

- Aim the camera at the gray scale chart.
- Adjust VR6002 so that the picture on the E.V.F. is proper condition.

(7) CONTRAST ADJUSTMENT

- Aim the camera at the registration chart.
- Adjust VR627 so that the picture on the E.V.F. is proper condition.

[5] AUTO DATE CIRCUIT

(1) DISPLAY POSITION ADJUSTMENT

1. Cap the lens.
2. Set the Date & Time Switch to the "DATE & TIME" position, and note the "a" portion.
3. Set the Date & Time Switch to the "DATE" position and note the "b" portion.
4. Adjust VR702 so that the "a" portion is equal to the "b" portion ($a = b$).

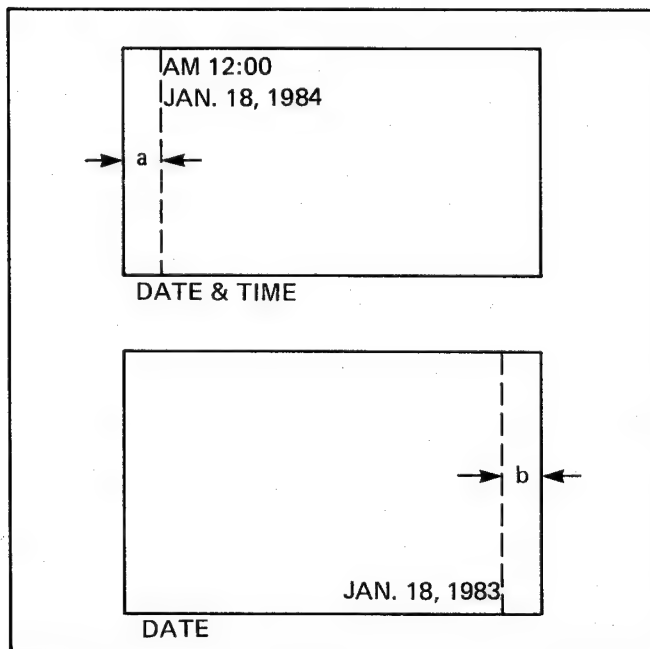


Fig. 41

Auto Focus Servicing Tools List

Auto Focus Jigs Set	VFKW0006
Precision Driver	VFKW0006A
Diffusion Cap	VFKW0006B
Infrared Ray Detect Camera	VFKW0006C
Auto Focus Lens Adjustment Driver	VFKW0006D
Infrared Ray Position Chart (III)	VFKW0008
Gray Chart	VFKW0009

Auto Focus Lens Adjustment Procedures

- (1) Removal of Top and Side Covers (refer to section "Detailed Disassembly Method").
- (2) Infrared Light Emitting Diode (IR-LED) Position Adjustment.

Note:

We recommend that infrared light emitting diode position adjustment is performed in the dark room.

1. Set the camera and the infrared ray position chart as follows.

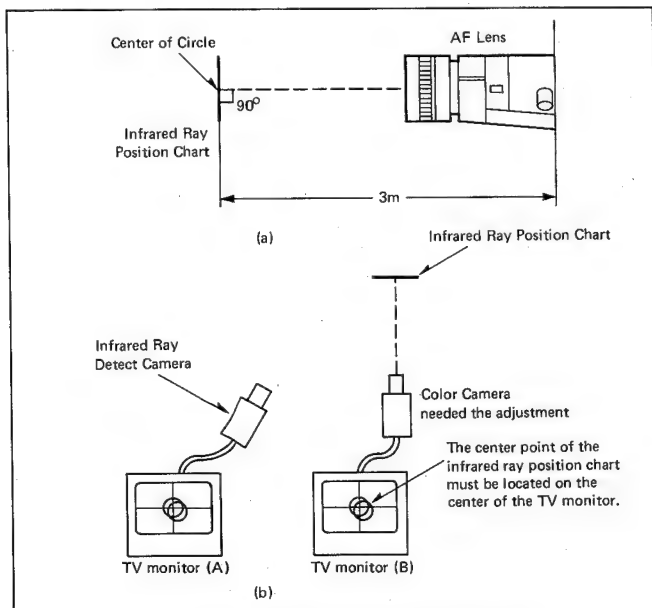


Fig. 1 Color Camera Setting Condition

2. Aim the camera at the infrared ray position chart and observe the picture on the TV monitor (B). The center point of the infrared ray position chart must be located on the center of the TV monitor screen.
3. Then, aim the infrared rays detect camera at the infrared ray position chart and observe the picture on the TV monitor (A).

4. Loosen a screw (A) and adjust the LED horizontal position and LED vertical position so that the infrared ray is hit the circle ($\phi 100$) as shown in Fig. 1-(b), TV monitor (A). (Irradiated position is less than the circle $\phi 100$).

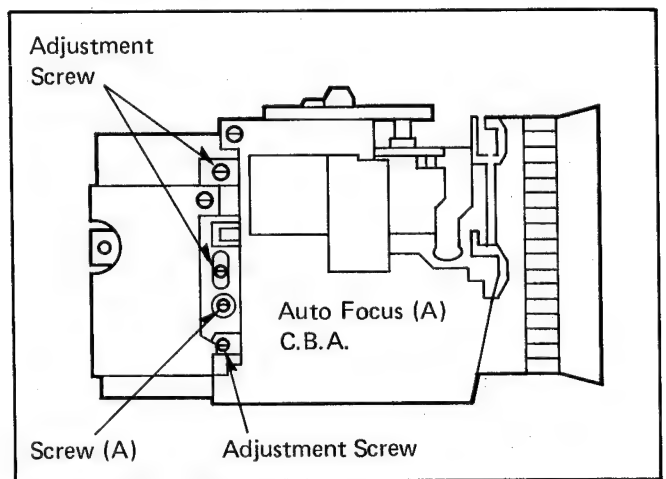


Fig. 2 LED Position Adjustment

(3) Offset Adjustment

1. Remove the top and side covers (refer to section "Detailed Disassembly Method").
2. Connect the read wire to pin 9, 10, 11, 16 and 32 of HIC6552 on Auto Focus (A) circuit board (see Fig. 3).

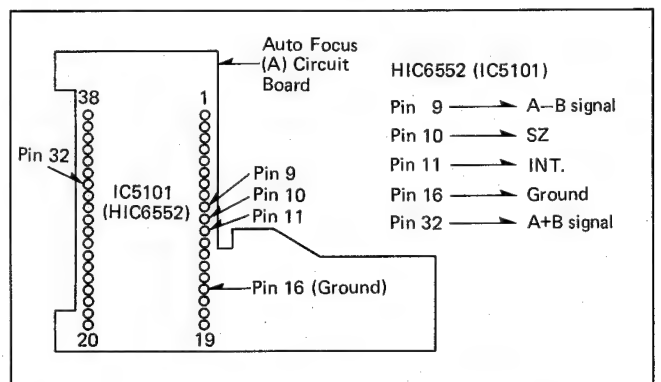


Fig. 3 Auto Focus (A) Circuit Board

3. Cover the distance detection window (receiver side) with the thick black paper as shown in Fig. 4.

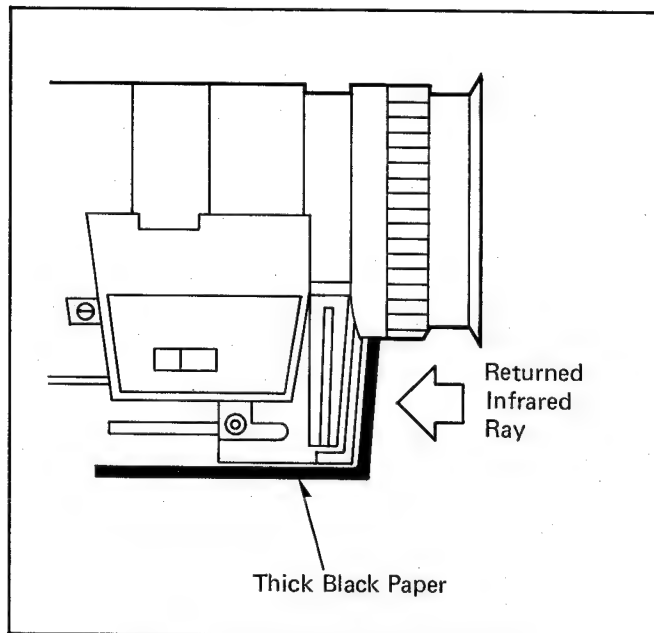


Fig. 4 Covering Method (Top View)

4. Connect a jumper between pin 11 of HIC6552 and ground (pin 16 of HIC6552).
5. Next, connect the oscilloscope probe to pin 32 of HIC6552 (A+B signal).
Trigger the oscilloscope with pin 10 of HIC6552 (SZ).
6. Connect the other oscilloscope probe to pin 9 of HIC6552 (A-B signal) and observe the waveform.
7. Then, adjust VR5102 (A+B SIGNAL OFFSET ADJ.) so that the waveform level is 2.7 (+ - 0.05) Vp-p. Adjust VR5103 (A-B SIGNAL OFFSET ADJ.) so that the waveform level is 2.7 (+ - 0.02) Vp-p as shown in Fig. 5.

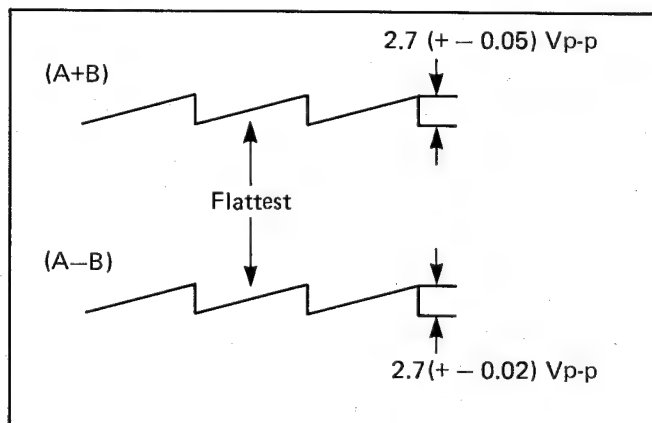


Fig. 5 A+B, A-B Signal Waveform

- (4) Silicon Photodiode (SPD) Vertical Position Adjustment

1. Remove the top and left side covers (refer to section "Detailed Disassembly Method").
2. Directly connect pin 11 of HIC6552 to the ground (pin 16 of HIC6552).
3. Aim the camera at the Gray Chart (VEKW0009) as shown in Fig. 6.

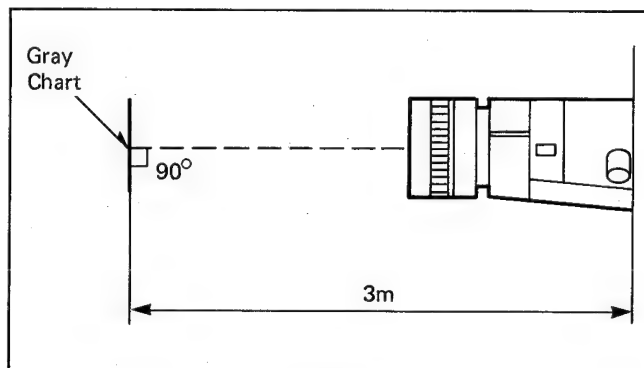


Fig. 6

4. Confirm the focus ring indicates the 3 meter.
If the focus ring doesn't indicate 3 meter, adjust the SPD vertical position adjustment screw as shown in Fig. 7 (Coarse).

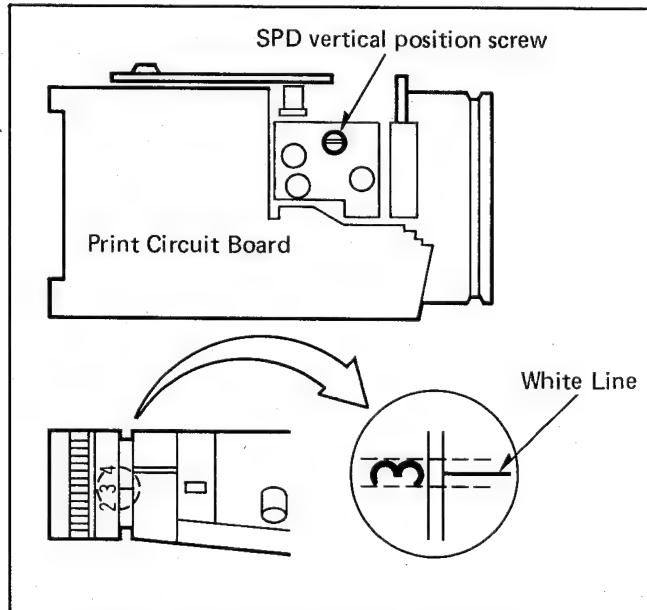


Fig. 7 SPD Vertical Position Adjustment

5. Connect the oscilloscope to pin 32 of HIC6552 (A+B signal).
6. Connect the other oscilloscope probe to pin 9 of HIC6552 (A-B signal).
Trigger the oscilloscope with pin 10 of HIC6552 (SZ).
7. Adjust the VR5104 (A+B), VR5105 (A-B) so that the priode (A) on the waveform is shorted as shown in Fig. 8.

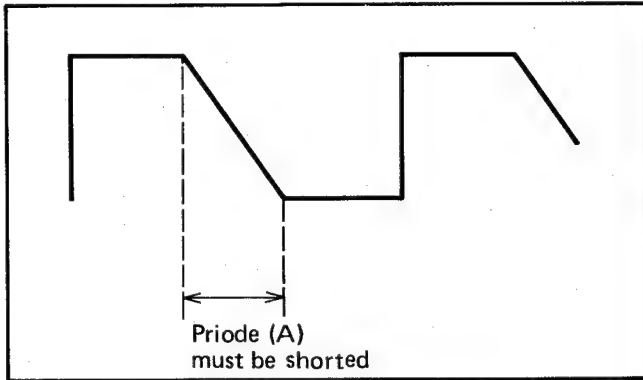


Fig. 8 Priode (A) must be shorted

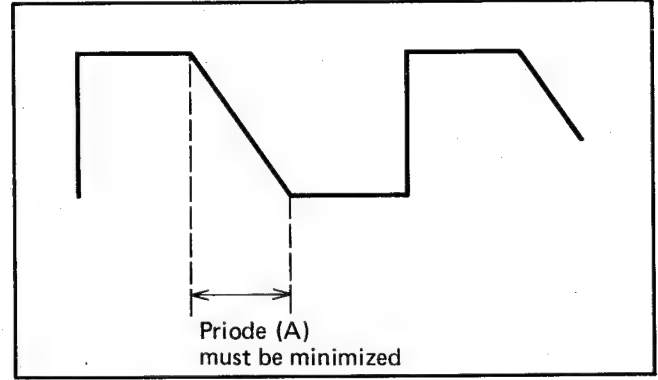


Fig. 10 The waveform of p32 (A+B)

- (5) Confirmation of Offset Adjustment
Check the offset adjustment and adjust it if necessary.

(6) Silicon Photodiode (SPD) Horizontal Position Adjustment

1. Remove the top and side covers (refer to section "Detailed Disassembly Method").
2. Connect the pin 11 of HIC6552 to the ground (pin 16 of HIC6552).
3. Aim the camera at the Gray Chart (VEKW0009).
4. Then, adjust the SPD vertical position adjustment screw so that the focus ring indicates the 3 meter position, return back to the 3 meter position from the infinity side and the near side as shown in Fig. 7.
5. Connect the oscilloscope to pin 32 of HIC6552. Trigger the oscilloscope to pin 10 of HIC6552 and observe the waveform.
6. Loosen a screw (B) and adjust the SPD horizontal position adjustment hole so that the priode (A) on the waveform is minimized as shown in Fig. 9, 10.

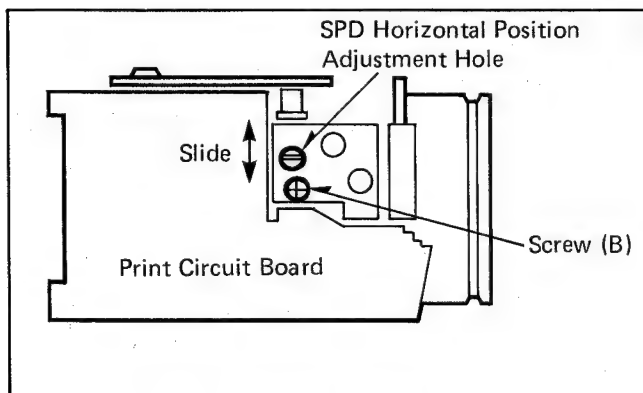


Fig. 9 SPD Horizontal Position Adjustment

7. Finally, screw a screw (B) and fix the horizontal position adjustment hole by the adhesive agent.

(7) Hunting Adjustment

1. Remove the top and side covers.
2. Set the camera and the infrared ray position chart as shown in Fig. 1.
3. Disconnect the read wire between pin 11 and pin 16.
4. Confirmation:
If the focus ring is fully turned to both infinity and near sides by hand and released the hand, the focus ring must indicate the 3 meter position $\pm 1\text{mm}$ as shown below. If the focus ring doesn't indicate, properly adjust VR5104.

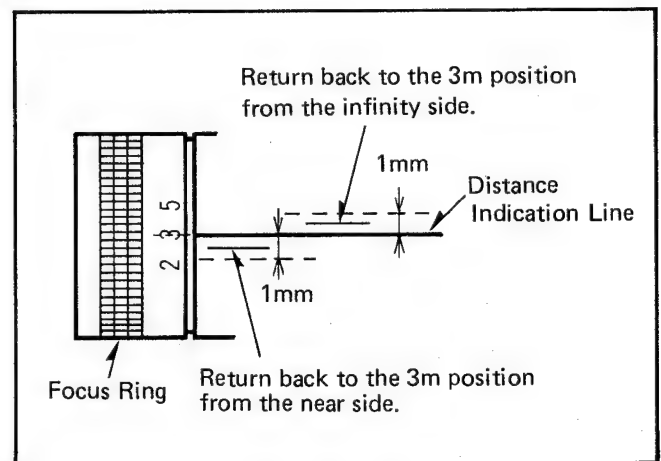
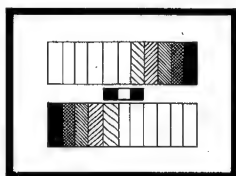


Fig. 11 Hunting Adjustment

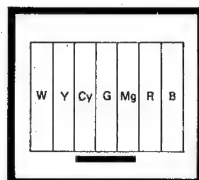
5. If hunting does not stop, adjust VR5101.
- | | | |
|------------------|---|------------------------|
| Clockwise | → | Dead Band width extend |
| Counterclockwise | → | Dead Band width narrow |

COLOR CAMERA SERVICING FIXTURES

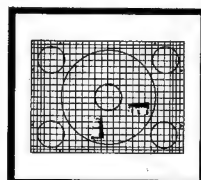
VFKS002 LIGHT BOX W/CHART SET



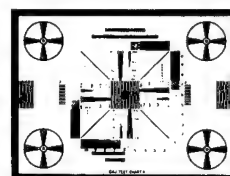
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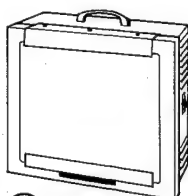
②



③



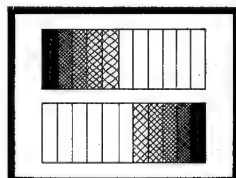
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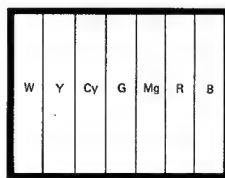
⑤

- ① VFKS002A Gray Scale Chart
- ② VFKS002B Color Chart
- ③ VFKS002C Registration Chart
- ④ VFKS002D Resolution Chart
- ⑤ VFKS002Y Light Box

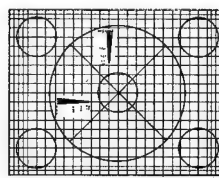
VFKS003 REFLECTION CHART SET



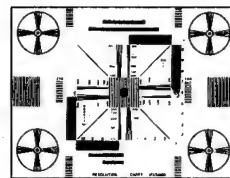
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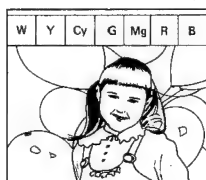
②



③



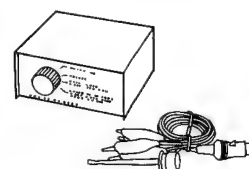
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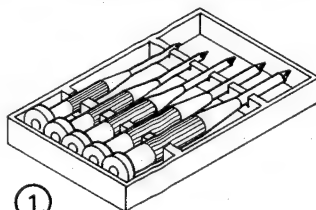
⑤

- ① VFKS003A Gray Scale Chart
- ② VFKS003B Color Chart
- ③ VFKS003C Registration Chart
- ④ VFKS003D Resolution Chart
- ⑤ VFKS003E Color Sheet

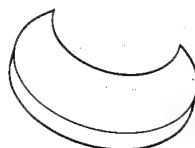
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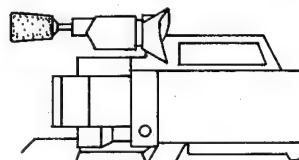
VFKW0006 AUTO FOCUS JIGS SET



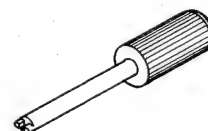
①



②

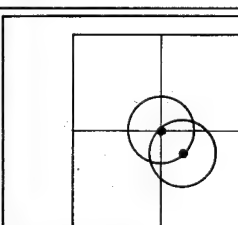


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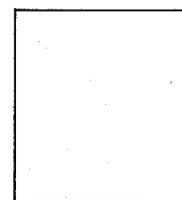


④

- ① VFKW0006A Precision Driver
- ② VFKW0006B Diffusion Cap
- ③ VFKW0006C Infrared Ray Detect Camera
- ④ VFKW0006D Adjustment Driver



VFKW0008
Infrared Ray Position Chart(II)



VFKW0009
Gray Chart

Service Manual

Color Video Camera

PK-450B
PK-450S
PK-410

Vol. 3

Block Diagrams

**PK-450B**

SPECIFICATIONS

Power Source: DC 12V \pm 10%
 AC 120V \pm 10%, 60Hz \pm 0.5%
 (with Power Supply Unit)

Power Consumption: DC 4.6W at 12V DC (Battery)
 (5.0W with Auto Focus on)

Newvicon Tube
 System: 1/3" frequency separation single tube
 system (built-in stripe filter)

Single Carrier
 Frequency: 3.58MHz

Focus System: Electro-static type

Lens Mounting: Built-in zoom lens (not "C" mount)

Lens: 6:1 zoom lens with auto iris control
 Power zoom lens and macro construction
 F: 1.2, f: 7mm—42mm (Auto Focus)
 d: 1.2m to infinity (Auto Focus)
 F: 1.4, f: 8mm—48mm (Manual Focus)
 d: 1.0m to infinity (Manual Focus)

Lens Diameter: 49mm

Light Sensitivity: Minimum light intensity on optical
 image: 20 Lux (F: 1.2) (Auto Focus)
 30 Lux (F: 1.4) (Manual Focus)
 Optimum light intensity on optical
 image: 900 Lux

Video Output Level: 1.0Vp-p, 75 Ω (standard NTSC signal)

Sync. System: Internal Sync: RS-170

Signal to Noise Ratio: More than 45dB

Horizontal Resolution: 260 lines

Color Temperature

 Control: 2 step switch (indoor/outdoor) & Auto
 adjust

Microphone: Condenser microphone

Audio Output Level: -20dB, Hi-impedance

Audio Output

 Impedance: High impedance (1k Ω)

External Microphone

 Input Impedance: 600 Ω unbalanced

Electronic Viewfinder: Mono chrome 1/2 inch CRT

Operating

Temperature: 5°C to 40°C

Operating Humidity: 10% to 75%

Operating Position: Normal position only

Weight:

Without handle grip

2.4 lbs (with lens, 7 ft cable) (Auto Focus)

Without handle grip

2.0 lbs (with lens, 7 ft cable) (Manual Focus)

AC adapter (option)

2.4 lbs

Dimensions:

 10.2"(W) \times 3.7"(H) \times 4.3"(D) (Auto Focus)

 258mm(W) \times 94mm(H) \times 110mm(D)

 9.2"(W) \times 4.3"(H) \times 3.7"(D) (Manual Focus)

 234mm(W) \times 110mm(H) \times 94mm(D)

Weight and dimensions shown are approximate.

Specifications are subject to change without notice.

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 One Panasonic Way, Secaucus,
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 Panasonic Hawaii Inc.
 91-238 Kauhū St. Ewa Beach
 P.O. Box 774
 Honolulu, Hawaii 96808-0774

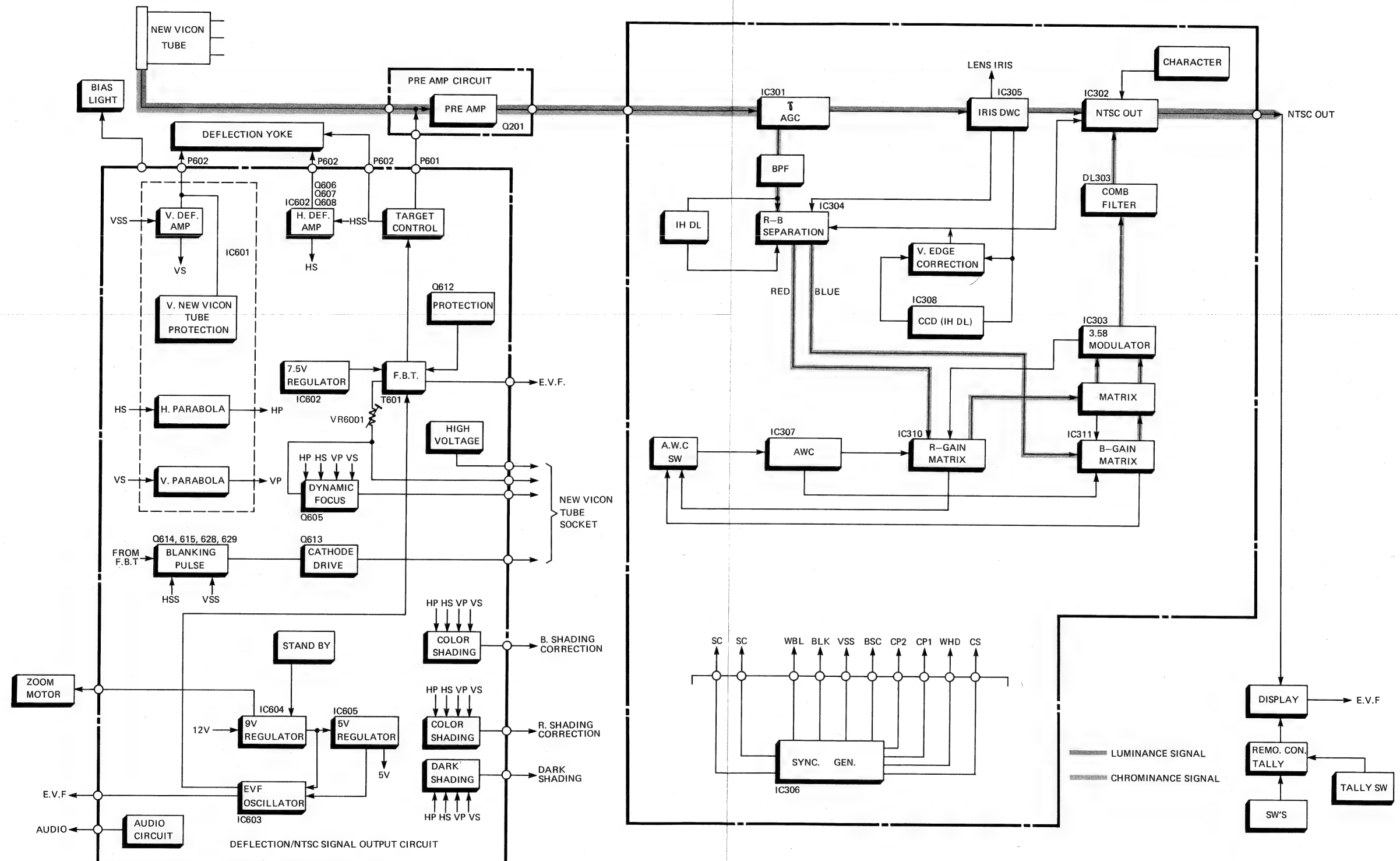
 Panasonic Canada
 Division of Matsushita Electric
 of Canada Limited
 5770 Ambler Drive, Mississauga,
 Ontario, L4W 2T3

 Panasonic Sales Company,
 Division of Matsushita Electric
 of Puerto Rico, Inc.
 Ave. 65 De Infantería, KM 9.7
 Victoria Industrial Park
 Carolina, Puerto Rico 00630

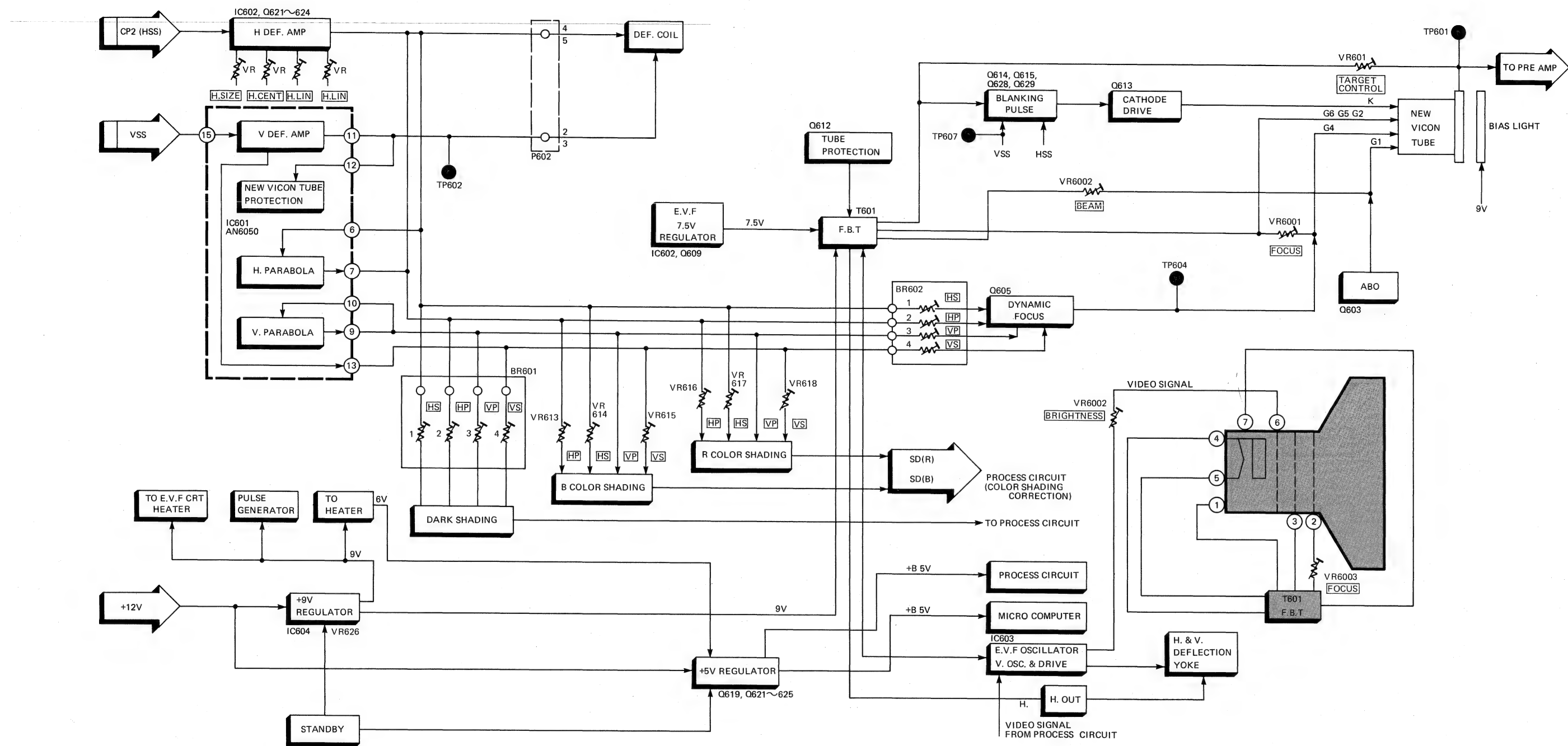
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DEFLECTION & ELECTRONIC VIEWFINDER BLOCK DIAGRAMS	3-2
PROCESS BLOCK DIAGRAM	3-3
AUTO DATE BLOCK DIAGRAM	3-4
AUTO FOCUS BLOCK DIAGRAM	3-4

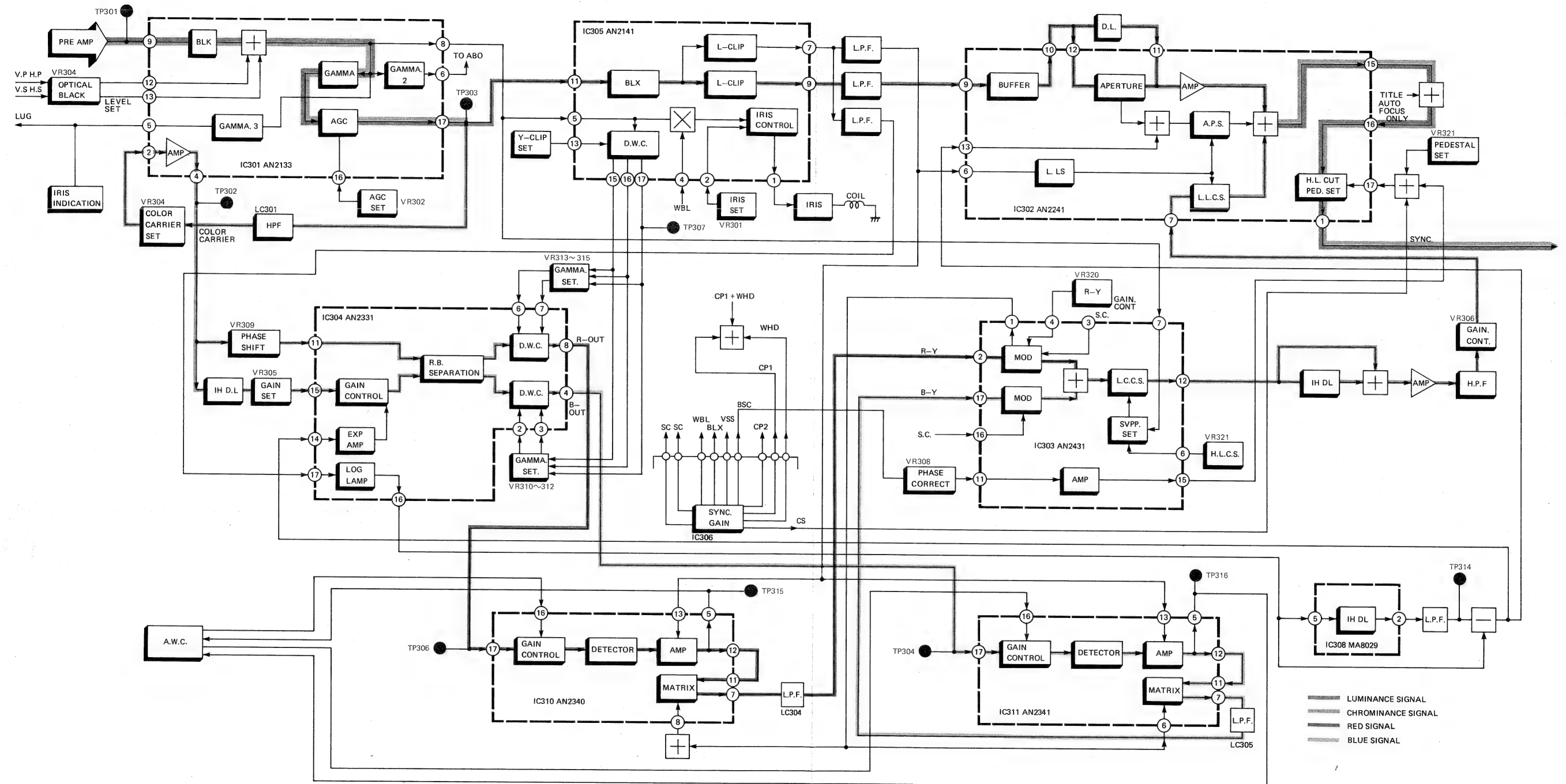
OVERALL BLOCK DIAGRAM



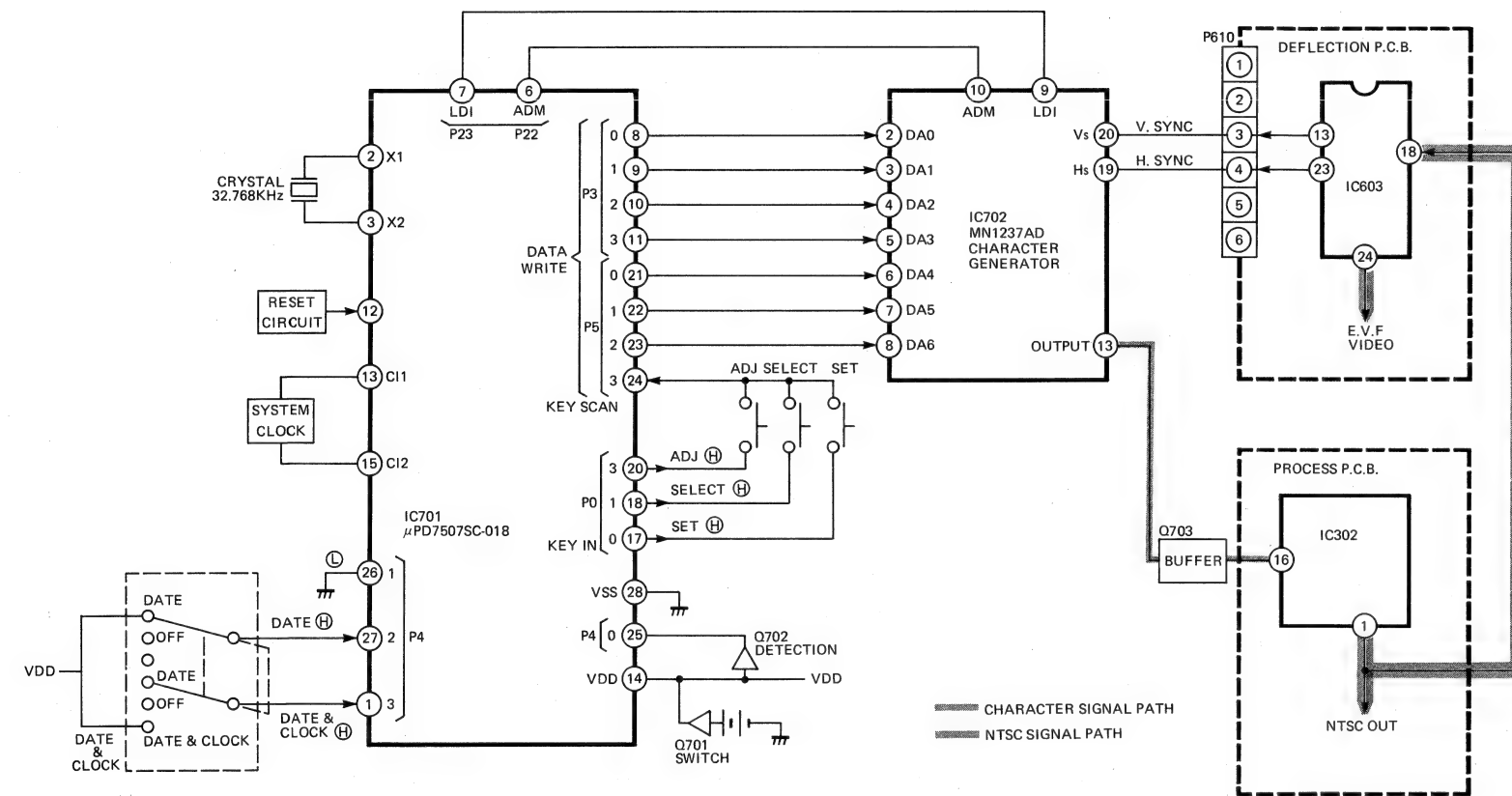
DEFLECTION & ELECTRONIC VIEWFINDER BLOCK DIAGRAMS



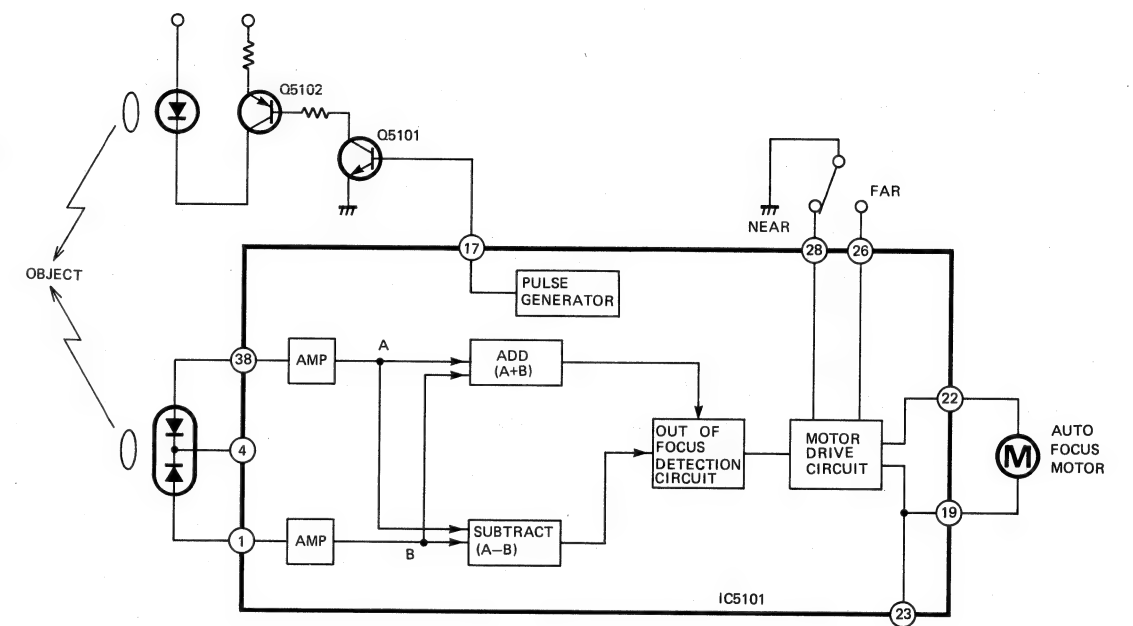
PROCESS BLOCK DIAGRAM



AUTO DATE BLOCK DIAGRAM



AUTO FOCUS BLOCK DIAGRAM



Service Manual

Color Video Camera

Vol. 4

Schematic Diagrams
Printed Circuit
Board Diagrams

PK-450B
PK-450S
PK-410

**PK-450B**

SPECIFICATIONS

Power Source: DC 12V \pm 10%
 AC 120V \pm 10%, 60Hz \pm 0.5%
 (with Power Supply Unit)

Power Consumption: DC 4.6W at 12V DC (Battery)
 (5.0W with Auto Focus on)

Newvicon Tube
 System: 1/3" frequency separation single tube
 system (built-in stripe filter)

Single Carrier
 Frequency: 3.58MHz

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Lens: 6:1 zoom lens with auto iris control
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 d: 1.0m to infinity (Manual Focus)

Lens Diameter: 49mm

Light Sensitivity: Minimum light intensity on optical
 image: 20 Lux (F: 1.2) (Auto Focus)
 30 Lux (F: 1.4) (Manual Focus)
 Optimum light intensity on optical
 image: 900 Lux

Video Output Level: 1.0Vp-p, 75 Ω (standard NTSC signal)

Sync. System: Internal Sync: RS-170

Signal to Noise Ratio: More than 45dB

Horizontal Resolution: 260 lines

Color Temperature

Control: 2 step switch (indoor/outdoor) & Auto
 adjust

Microphone: Condenser microphone

Audio Output Level: -20dB, Hi-impedance

Audio Output
 Impedance: High impedance (1k Ω)

External Microphone
 Input Impedance: 600 Ω unbalanced

Electronic Viewfinder: Mono chrome 1/2 inch CRT

Operating
 Temperature: 5°C to 40°C

Operating Humidity: 10% to 75%

Operating Position: Normal position only
 Without handle grip
 2.4 lbs (with lens, 7 ft cable) (Auto Focus)
 Without handle grip
 2.0 lbs (with lens, 7 ft cable) (Manual Focus)
 AC adapter (option)
 2.4 lbs

Diemensions: 10.2"(W) \times 3.7"(H) \times 4.3"(D) (Auto Focus)
 258mm(W) \times 94mm(H) \times 110mm(D)
 9.2"(W) \times 4.3"(H) \times 3.7"(D) (Manual Focus)
 234mm(W) \times 110mm(H) \times 94mm(D)

Weight and dimensions shown are approximate.
 Specifications are subject to change without notice.

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CIRCUIT BOARD LAYOUT

Left Side View →

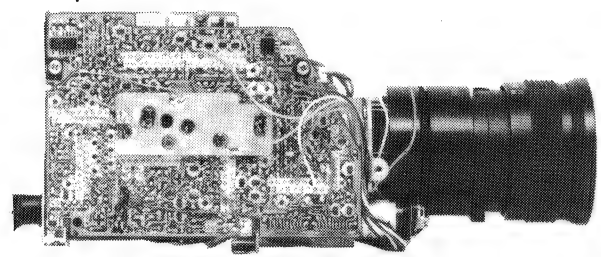
Right Side View I ←

Right Side View II ←



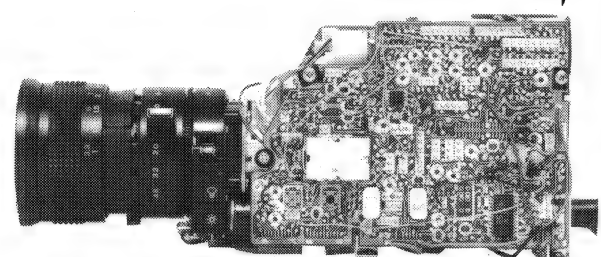
Left Side View

Process Circuit Board (for Auto Focus VEPW0251)
(for Manual Focus VEPW0251A)

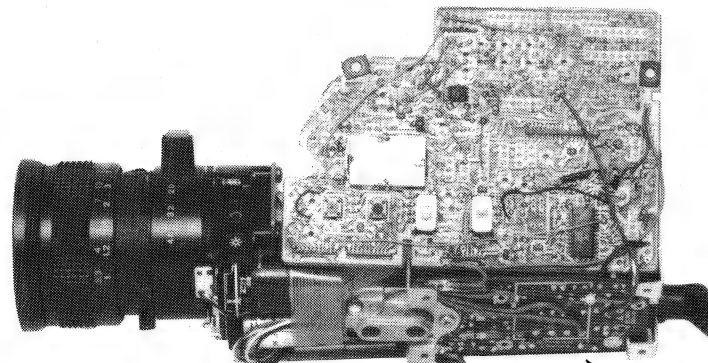


Right Side View I

Deflection Circuit Board (for Auto Focus VEPW0252)
(for Manual Focus (VEPW0252



Right Side View II



High Voltage Print Circuit Board (VEPW0253)

The schematic diagram illustrates the horizontal deflection circuit, divided into four sections: A, B, C, and D.

- Section A (Deflection Control):** Receives signals from the TUBE and DEFLECTION C.B.A. TO P601-3 (+9V). It includes a 430μF capacitor (L201), a 5.6M resistor (R201), and a 100K resistor (R211). The circuit is connected to the DEFLECTION C.B.A. TO P601-1 (TARGET) and (GND).
- Section B (Driver Stage):** Features a 2S8316 (Q201) tube. It includes a 2.7M resistor (R203), a 100V 0.1 capacitor (C205), a 180 resistor (R204), a 6.3V 47 capacitor (C206), a 1.5K resistor (R212), and a 6.3V 10 capacitor (C208). It is connected to the DEFLECTION C.B.A. TO P601-1 (TARGET) and (GND).
- Section C (Output Stage):** Includes a 25C2404 (Q203) tube. It features a 2.2K resistor (R206), a 240 resistor (R207), a 27K resistor (R208), a 10V 4.7 capacitor (C210), a 6.3V 10 capacitor (C207), a 0.1 capacitor (C209), a 22K resistor (C213), a 50P capacitor (C212), and a 62K resistor (R215). It is connected to the DEFLECTION C.B.A. TO P601-1 (TARGET) and (GND).
- Section D (Load and Output):** Includes a 2SD601(R) tube. It features a 10μH inductor (L202), a 220 resistor (R210), a 7.5 resistor (R216), a 3.3K resistor (R217), a 120K resistor (R213), a 6.8K resistor (R214), and a 75 resistor (R218). It is connected to the DEFLECTION C.B.A. TO P302-1 (PRE-AMP OUT) (GND).

4-1

DEFLECTION CIRCUIT BOARD (FOR AUTO FOCUS VEPW0252) (FOR MANUAL FOCUS VEPW0252A)

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY SHADE HAVE SPECIAL
CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE
SPECIFIED PARTS.

Note:
This Printed Circuit Board Indicates all components used
for both AUTO FOCUS and MANUAL FOCUS models.
Please refer to a "Note" on the corresponded schematic
diagrams for the components actually mounted.

- 1 MYLAR CAPACITOR
2 NON POLARITY CAPACITOR
3 TANTALUM CAPACITOR

Circuit Board

IC604	B-5	VR601	D-2
IC605	C-5	VR602	F-4
		VR603	G-4
Q601	D-2	VR607	A-2
Q602	A-2	VR608	D-4
Q603	A-1	VR613	D-5
Q604	D-4	VR614	D-5
Q605	E-4	VR615	E-5
Q606	C-4	VR616	D-4
Q607	D-3	VR617	D-4
Q608	D-3	VR618	E-4
Q609	C-3	VR619	C-4
Q610	B-1	VR620	D-4
Q611	G-1	VR621	A-1
Q612	D-2	VR622	C-3
Q613	C-1	VR623	E-2
Q614	A-1	VR624	E-2
Q615	A-3	VR625	G-1
Q616	E-1	VR626	E-3
Q617	E-1	VR627	E-1
Q619	D-3		
Q620	G-3		
Q621	D-2	D605	F-4
Q622	D-2	D606	D-3
Q623	E-3	D607	B-4
Q624	E-3	D608	G-1
Q625	E-3	D609	E-2
Q626	F-3	D610	F-3
Q627	F-2	D611	E-2
Q628	B-3	D612	G-4
Q629	B-3	D613	F-3
Q630	D-2	D614	F-4
Q631	B-3	D615	E-1
Q632	B-3	D616	C-4
Q644	E-4		

B603	1 G
2 BEAM	
3 D.F. CORRECT	
4 7.5V A.V.R	
5 7.5V	
6	
7 TARGET K. BLK	
8 E.V.F VIDEO SIGNAL	

P607	1 Q6200 (E)
2 Q6200 (C)	
3 Q6200 (B)	

P610	1 +B (5V)
2 G	
3 V	
4 H	
5 DATE (H)	
6 DATE & CLOCK (H)	

P613	1 H
2 H	
3 G	
4 K	

P603	1 5V (+B)
2 BIAS (9V)	

B601	1 RESET (H)
2 PAUSE	
3 BACK LIGHT	
4 5V	
5 CP2	
6 B GAIN CONTROL	
7 R GAIN CONTROL	
8 1.8V	
9 V.S.S	
10 B GAIN CONTROL	
11 R GAIN CONTROL	

B602	1 O.B. SD
2 O.B. SD	
3 IRIS INDICATOR	
4 A.B.O	
5 9V	
6 IRIS DELAY	
7 COLOR SD	
8 COLOR SD	
9 COLOR SD	
10 COLOR SD	
11 FADE	

P611	1 G
2 NTSC	

P609	1
2 RESET	
3 STAND BY (H)	
4 12V	
5 PAUSE	

P605	1 AUDIO OUT
2 GND	

P601	1 TARGET
2 G	
3 +B (9V)	

P602	1 THERMISTOR
2 V. COIL	
3 V. COIL	
4 H. COIL	
5 H. COIL	
6 G	

P612	1 H
2 H	
3 K	

SPECIAL NOTE All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "Electrostatically Sensitive (ES) Devices" section of this service manual.

1 TP604
9Vp-p(0.2V/20 μ s div.)

2 TP602
4.5Vp-p(0.1V/5ms div.)

3 IC601. ⑫
1.5Vp-p(50mV/5ms div.)

4 IC603. ⑭
4Vp-p(0.1V/10 μ s div.)

5 IC603. ⑬
5.0Vp-p(0.2V/20 μ s div.)

6 IC603. ⑬
1Vp-p(20mV/10 μ s div.)

7 IC603. ⑬
5Vp-p(0.2V/5ms div.)

8 IC603. ⑬
4.5Vp-p(0.2V/5ms div.)

9 IC603. ⑮
4.2Vp-p(0.2V/5ms div.)

10 IC603. ⑰
1Vp-p(20mV/5ms div.)

11 TP603
130Vp-p(5V/20 μ s div.)

12 TP607
5Vp-p(0.2V/2ms div.)




13 TP606
6Vp-p(0.2V/20 μ s div.)

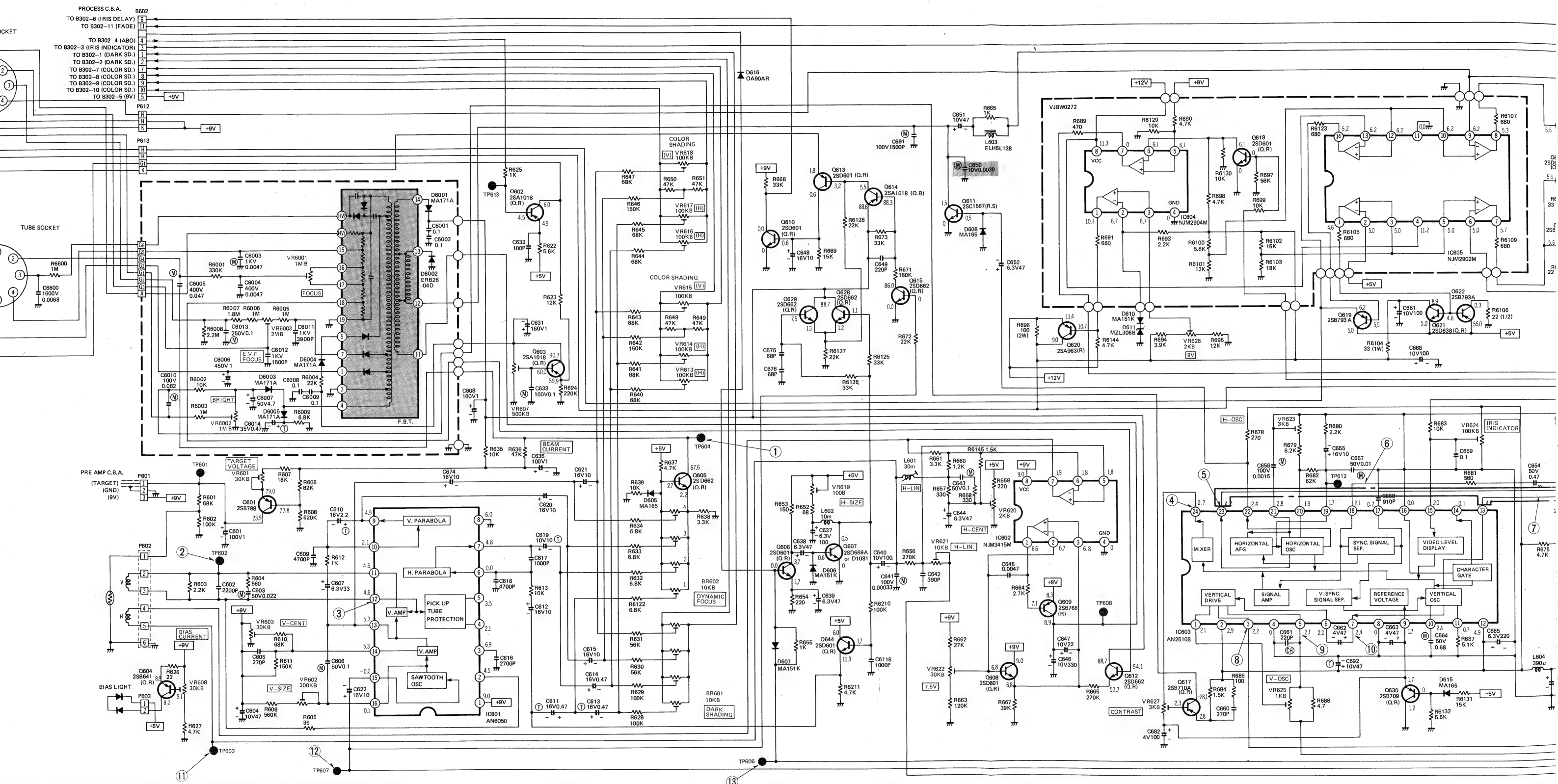
[illegible]

CTION SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:
COMPONENTS IDENTIFIED BY SHADE HAVE SPECIAL
CHARACTERISTICS IMPORTANT FOR SAFETY.
WHEN REPLACING ANY OF THESE COMPONENTS, USE ONLY THE
SPECIFIED PARTS.

Note:
The circuit board surrounded by a dotted line is applica-
ble to only AUTO FOCUS model.

- 1  MYLAR CAPACITOR
- 2  NON POLARITY CAPACITOR
- 3  TANTALUM CAPACITOR



A

B

C

D

E

F

G

H

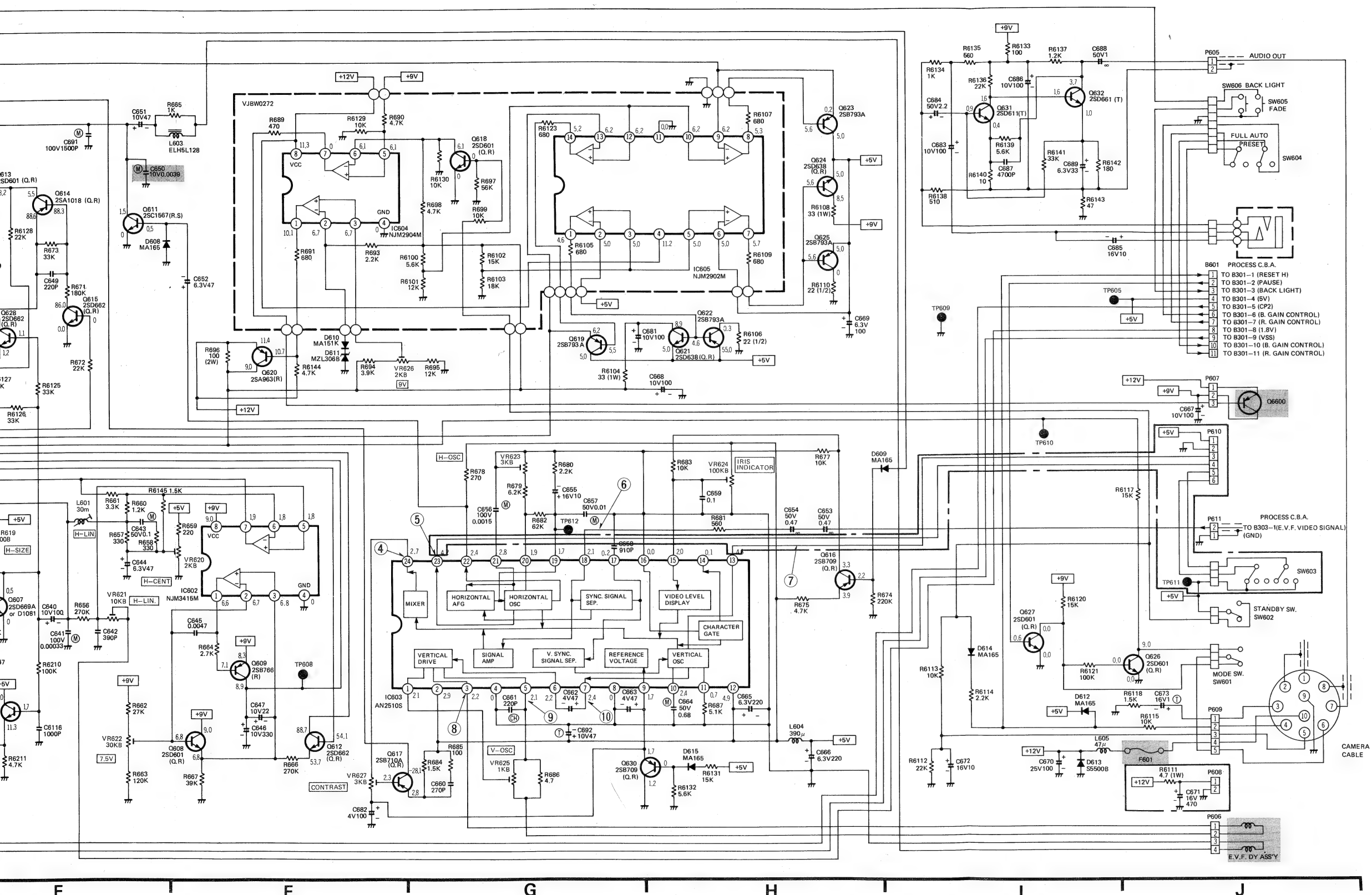
Note:
The circuit board surrounded by a dotted line is applicable to only AUTO FOCUS model.

- 1 — MYLAR CAPACITOR
2 — NON POLARITY CAPACITOR
3 — TANTALUM CAPACITOR

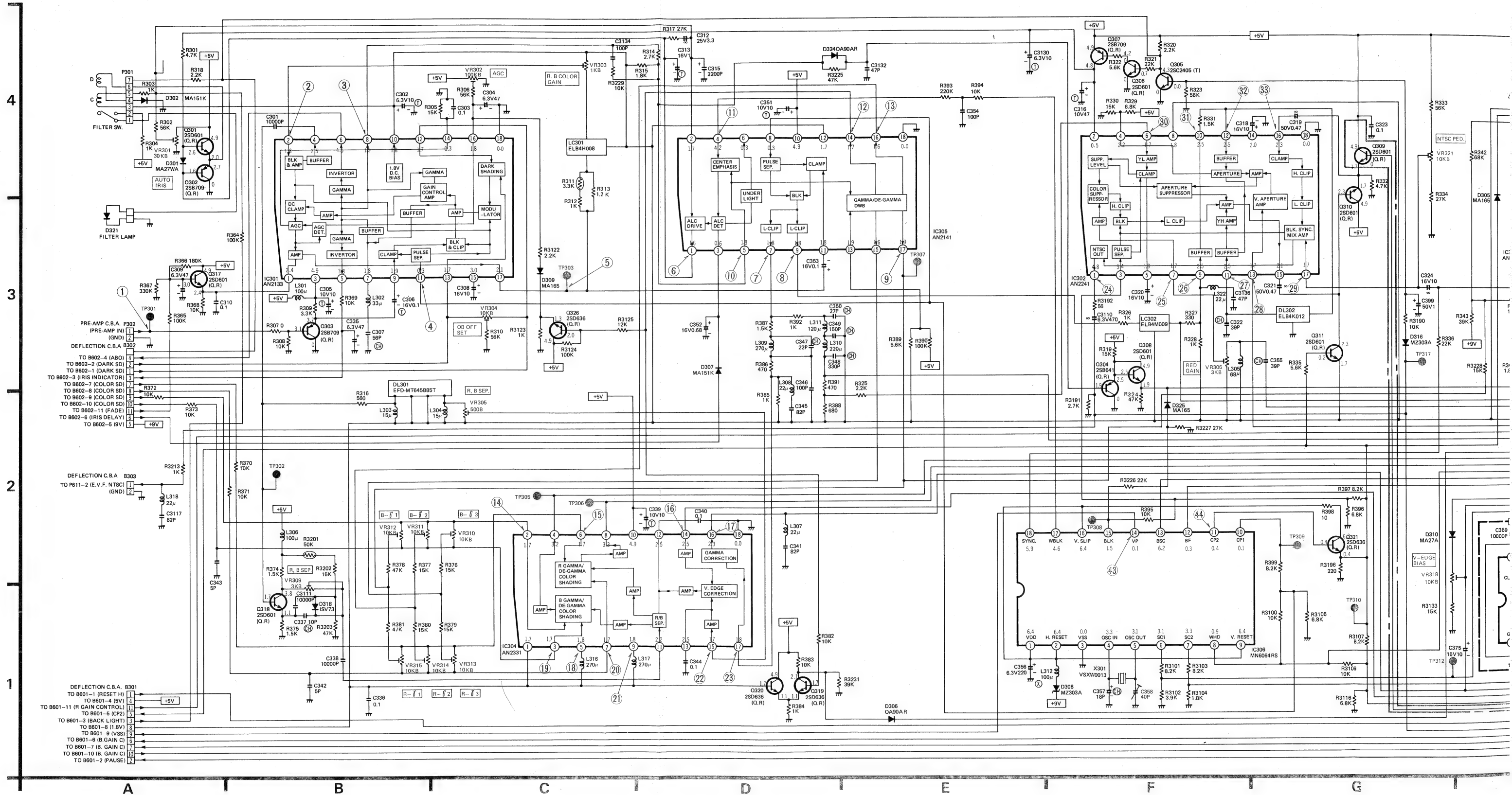
SPECIAL NOTE All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "Electrostatically Sensitive (ES) Devices" section of this service manual.

Schematic Diagram




VR601	TARGET VOLTAGE	B-2
VR602	V-SIZE	B-1
VR603	V-CENT	B-1
VR607	BEAM CURRENT	C-3
VR608	BIAS CURRENT	B-1
VR613	COLOR SHADING H	D-3
VR614	COLOR SHADING H	D-3
VR615	COLOR SHADING V	D-3
VR616	COLOR SHADING H	D-3
VR617	COLOR SHADING H	D-3
VR618	COLOR SHADING V	D-4
VR619	H-SIZE	E-2
VR620	H-CENT	F-2
VR621	H-LIN	E-2
VR622	7.5V	E-1
VR623	H-OSC	G-2
VR624	IRIS INDICATOR	H-2
VR625	V-OSC	G-1
VR626	9V	F-3
VR627	CONTRAST	F-1
L601	H-LIN	E-2



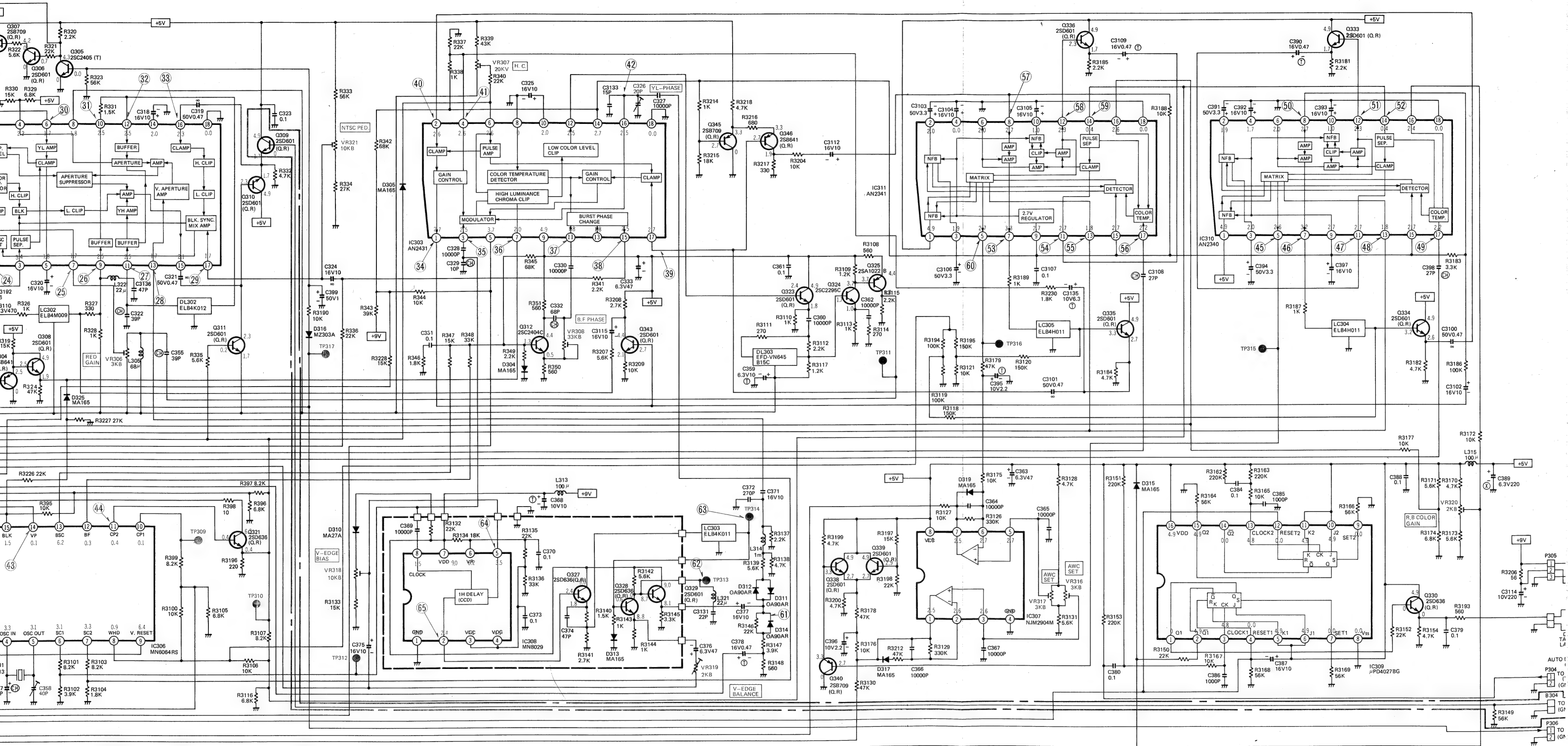
PROCESS SCHEMATIC DIAGRAM






Note:
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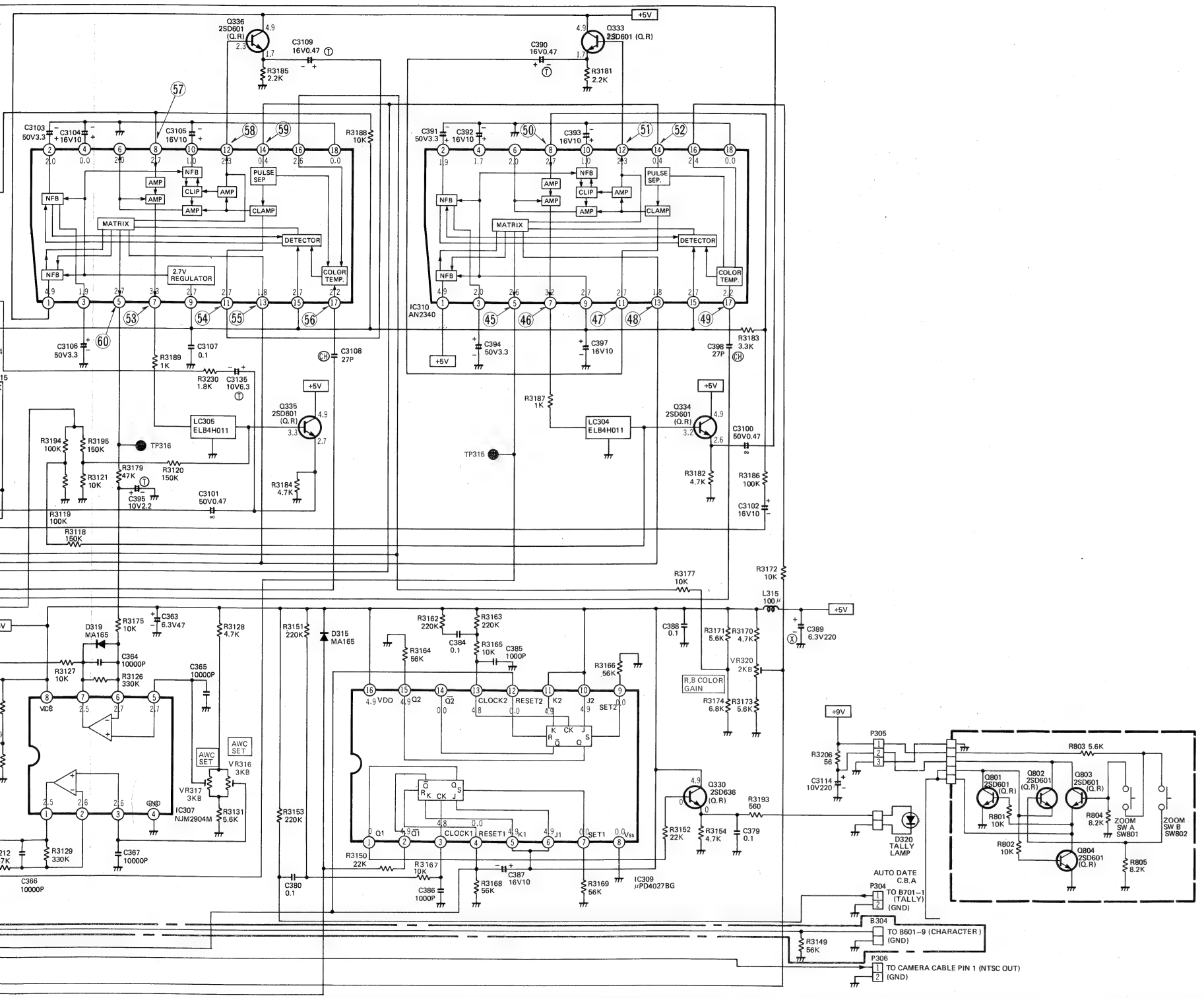
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section of this service manual.



F I G H I J K L M

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- 3  TANTALUM CAPACITOR

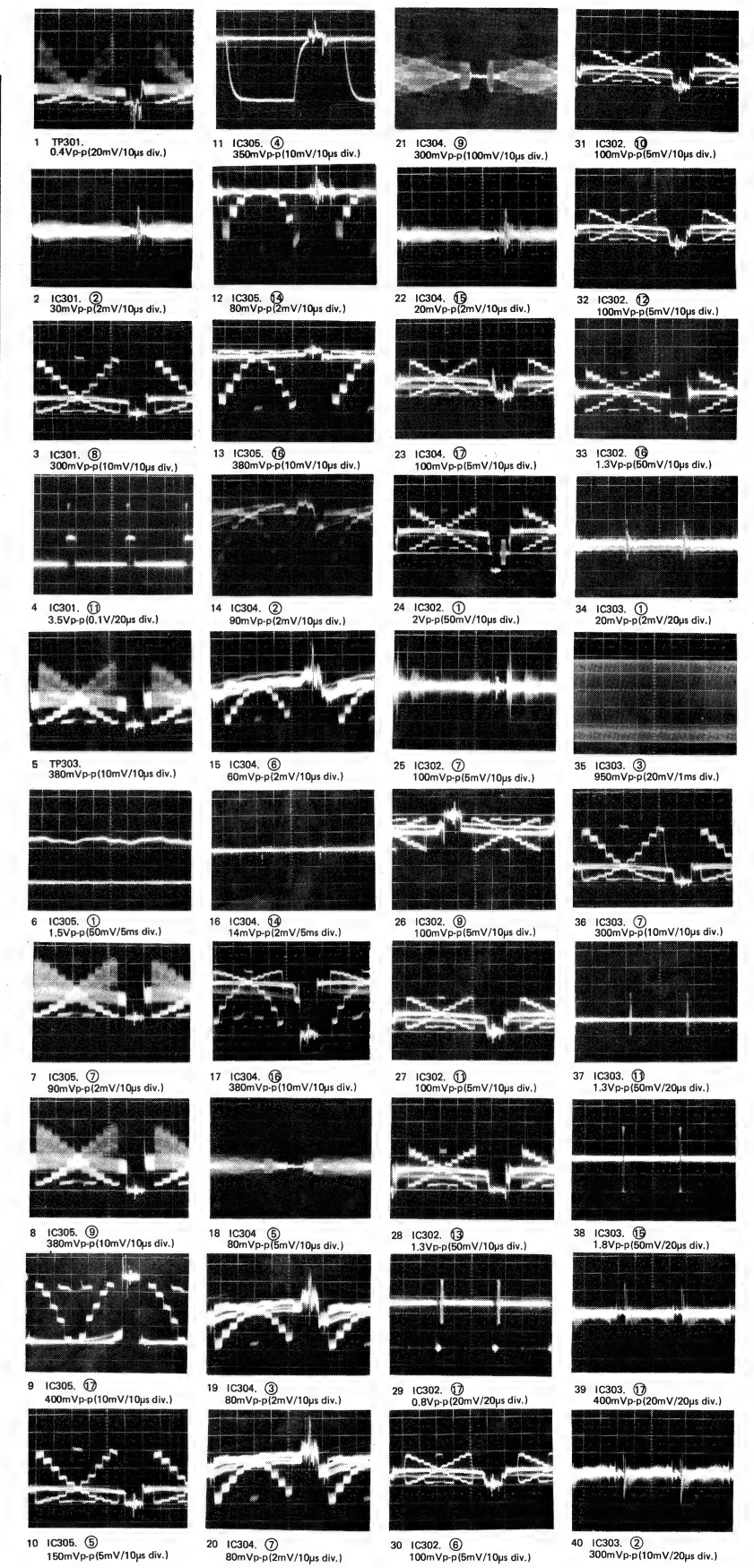
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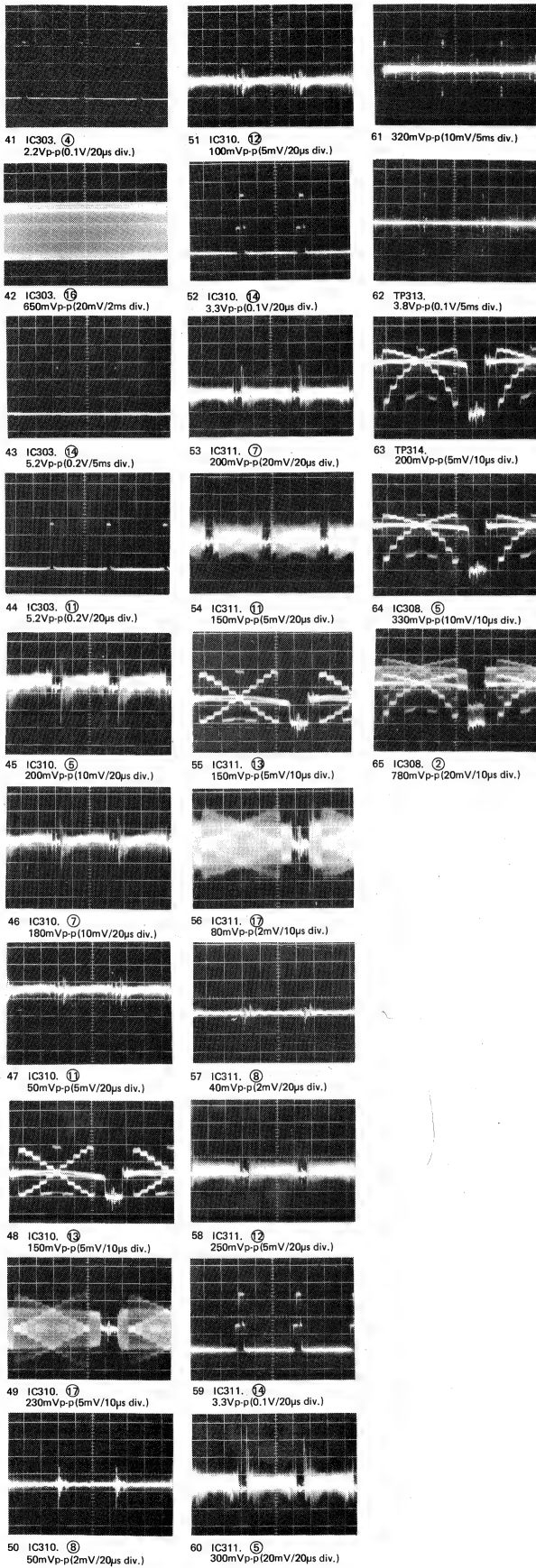
Schematic Diagram

VR301	AUTO IRIS	A-4
VR302	AGC	C-4
VR303	R.B COLOR GAIN	C-4
VR304	OB OFF SET	C-3
VR305	R.B SEP	C-2
VR306	RED GAIN	F-3
VR307	H.C	H-4
VR308	B.F PHASE	H-3
VR309	R.B SEP	B-1
VR310	B-3	C-2
VR311	B-2	B-2
VR312	B-1	B-2
VR313	R-3	C-1
VR314	R-2	B-1
VR315	R-1	B-1
VR316	AWC	K-1
VR317	AWC	K-1
VR318	V-EDGE BIAS	G-1
VR319	V-EDGE BALANCE	I-1
VR320	R.B COLOR GAIN	M-2
VR321	NTSC PED.	G-4
C326	YL-PHASE	I-4
C358		F-1

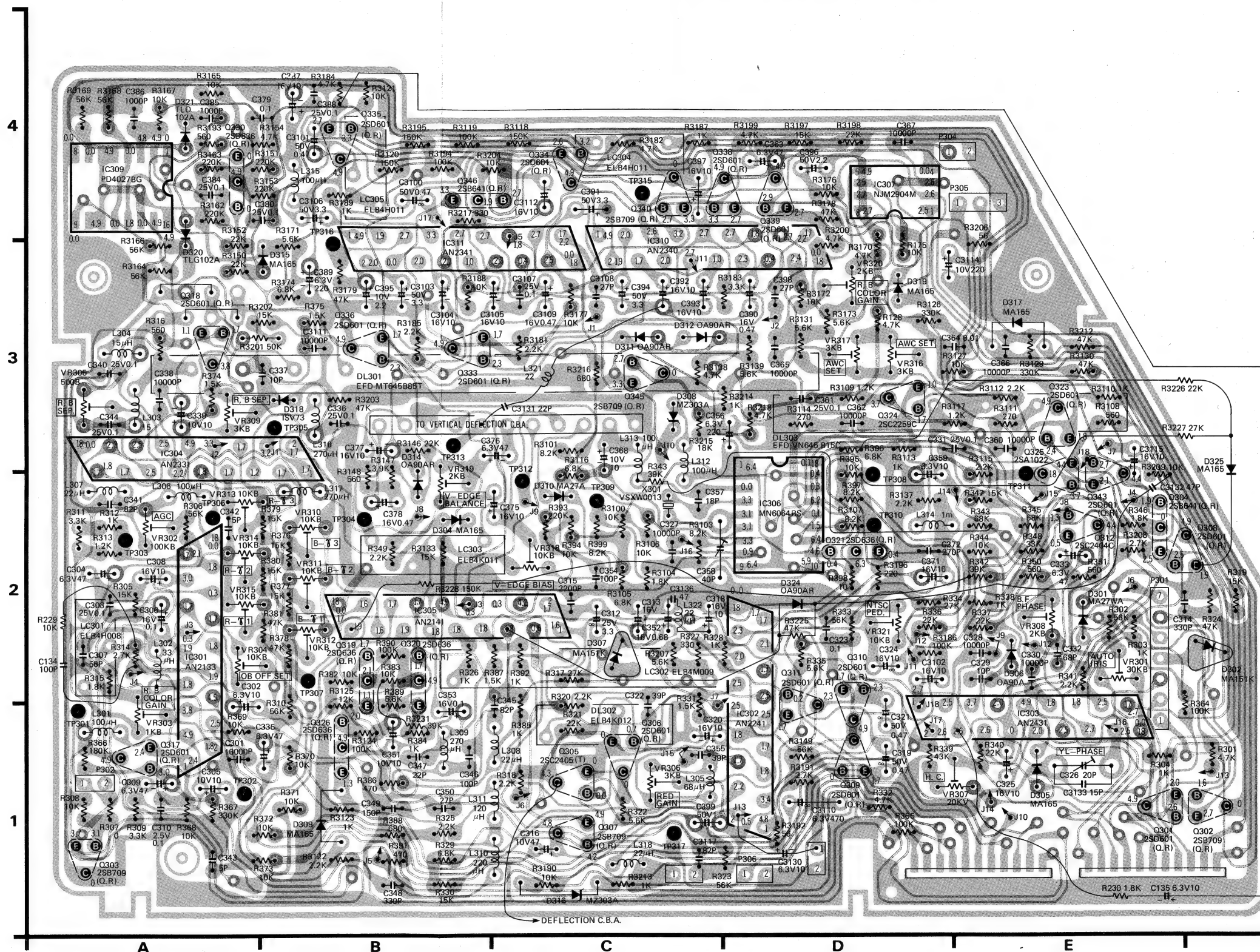
SIGNAL WAVE FORM (PROCESS)



SIGNAL WAVE FORM (PROCESS)



PROCESS CIRCUIT BOARD (FOR AUTO FOCUS VEPW0251)
(FOR MANUAL FOCUS VEPW0251A)



Note: This Printed Circuit Board Indicates all components used for both AUTO FOCUS and MANUAL FOCUS models. Please refer to a "Note" on the corresponded schematic diagrams for the components actually mounted.

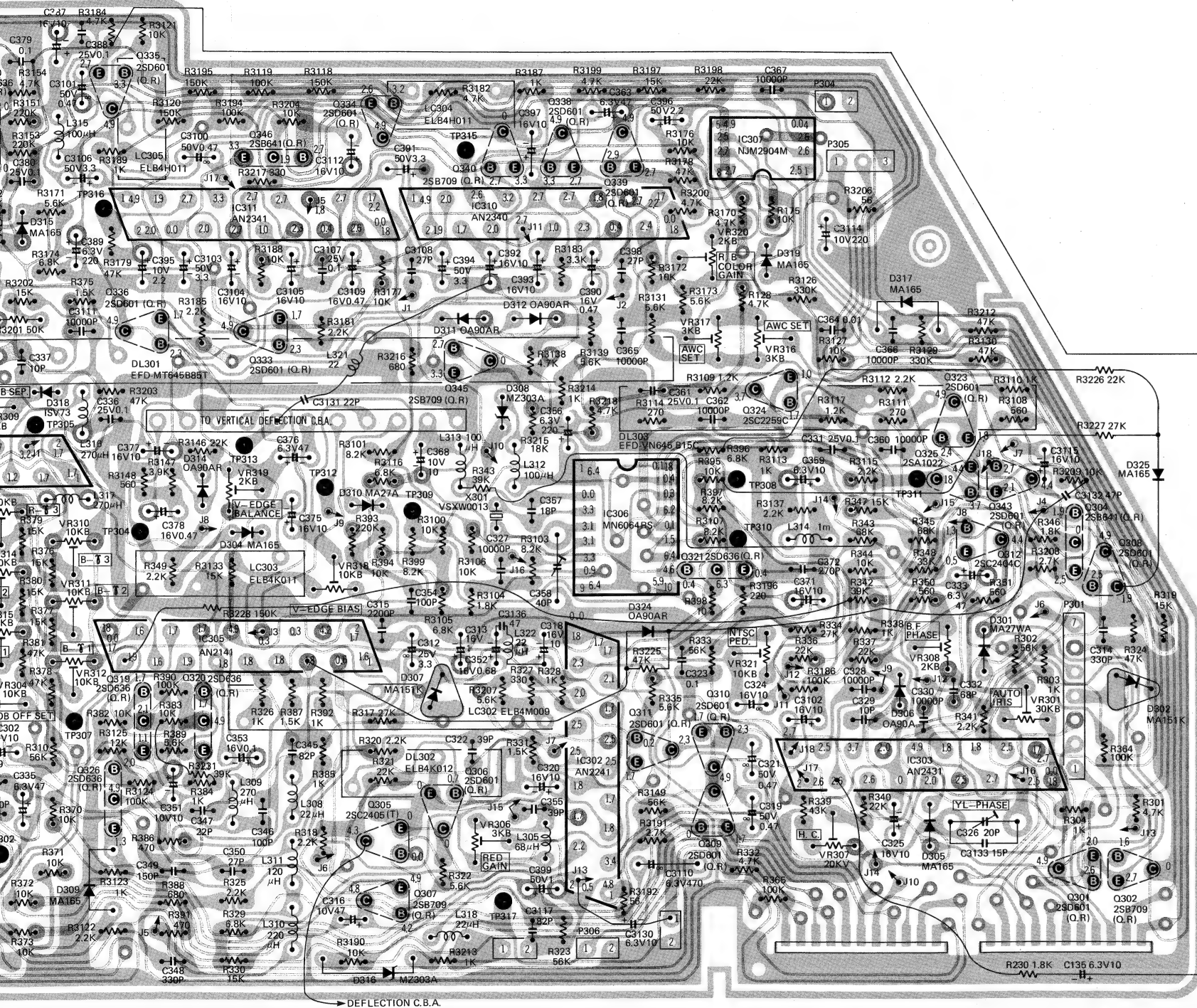
SPECIAL NOTE All integrated circuits and therefore require the special handling technique of this service manual.

- P301
- 1 FILTER SW
 - 2 FILTER SW
 - 3 CONTROL COIL
 - 4 DRIVE COIL
 - 5 CONTROL COIL
 - 6 DRIVE COIL
 - 7 A.F. STANDBY
- P305
- 1 +B (9V)
 - 2 POWER ZOOM
 - 3 G
- P306
- 1 NTSC
 - 2 G
- P302
- 1 PRE-AMP IN
 - 2 G
- B301
- 1 RESET
 - 2 PAUSE
 - 3 BACK LIGHT
 - 4 5V
 - 5 CP2
 - 6 B GAIN CONTROL
 - 7 R GAIN CONTROL
 - 8 1.8V
 - 9 VSS
 - 10 B GAIN CONTROL
 - 11 R GAIN CONTROL
- B302
- 1 O.B. SD
 - 2 O.B. SD
 - 3 IRIS INDICATOR
 - 4 A.B.O
 - 5 9V
 - 6 IRIS DELAY
 - 7 COLOR SD
 - 8 COLOR SD
 - 9 COLOR SD
 - 10 COLOR SD
 - 11 FADE
- B303
- 1 NTSC
 - 2 G
- B304
- 1 CHARACTER
 - 2 G
- P304
- 1 TALLY
 - 2 G

JIT BOARD (FOR AUTO FOCUS VEPW0251) (FOR MANUAL FOCUS VEPW0251A)

Note: This Printed Circuit Board Indicates all components used for both AUTO FOCUS and MANUAL FOCUS models. Please refer to a "Note" on the corresponded schematic diagrams for the components actually mounted.

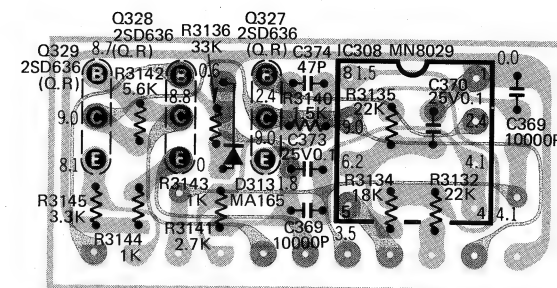
SPECIAL NOTE All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "Electrostatically Sensitive (ES) Devices" section of this service manual.



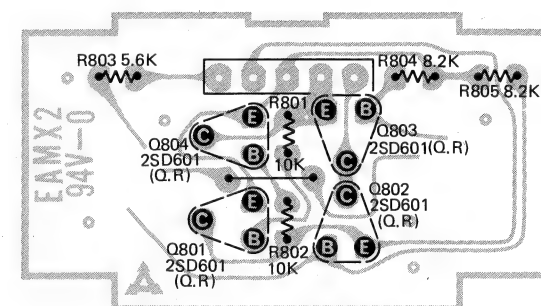
Circuit Board

IC301	A-2	VR302	A-2
IC302	D-1	VR303	A-1
IC303	E-1	VR304	A-2
IC304	A-3	VR305	A-3
IC305	B-2	VR306	C-1
IC306	D-2	VR307	D-1
IC307	D-4	VR308	E-2
IC309	A-4	VR309	A-3
IC310	C-3	VR310	B-2
IC311	B-3	VR311	B-2
		VR312	B-2
Q301	E-1	VR313	A-2
Q302	F-1	VR314	A-2
Q303	A-1	VR315	A-2
Q304	E-2	VR316	D-3
Q305	C-1	VR317	D-3
Q306	C-1	VR318	C-2
Q307	C-1	VR319	B-2
Q308	F-2	VR320	D-3
Q309	D-1	VR321	D-2
Q310	D-2		
Q311	D-2	C326	E-1
Q312	E-2	C358	C-2
Q317	A-1		
Q318	A-3	D301	E-2
Q319	B-2	D302	F-2
Q320	B-2	D304	B-2
Q321	D-2	D305	E-1
Q323	E-3	D306	E-2
Q324	D-3	D307	C-2
Q325	E-2	D308	C-3
Q326	B-1	D309	B-1
Q330	A-4	D310	C-2
Q333	B-3	D311	C-3
Q334	C-4	D312	C-3
Q335	B-4	D314	B-2
Q336	B-3	D315	B-3
Q338	C-4	D316	C-1
Q339	D-1	D317	E-3
Q340	C-4	D318	B-3
Q343	E-2	D319	D-3
Q345	C-3	D320	A-4
Q346	B-4	D321	A-4
		D324	D-2
VR301	E-2	D325	F-3

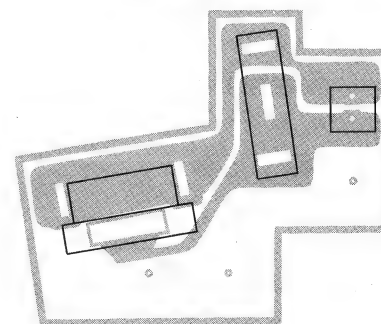
VERTICAL DEFLECTION C.B.A. (VEPW0271)



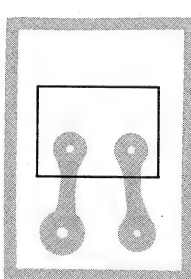
POWER ZOOM C.B.A. (VEPW0273)



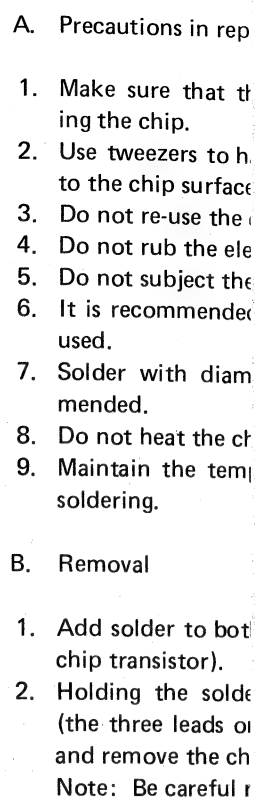
TALLY SW. (A) C.B.A. (VEPW0255)



TALLY SW. (B) C.B.A. (VEPW0281)

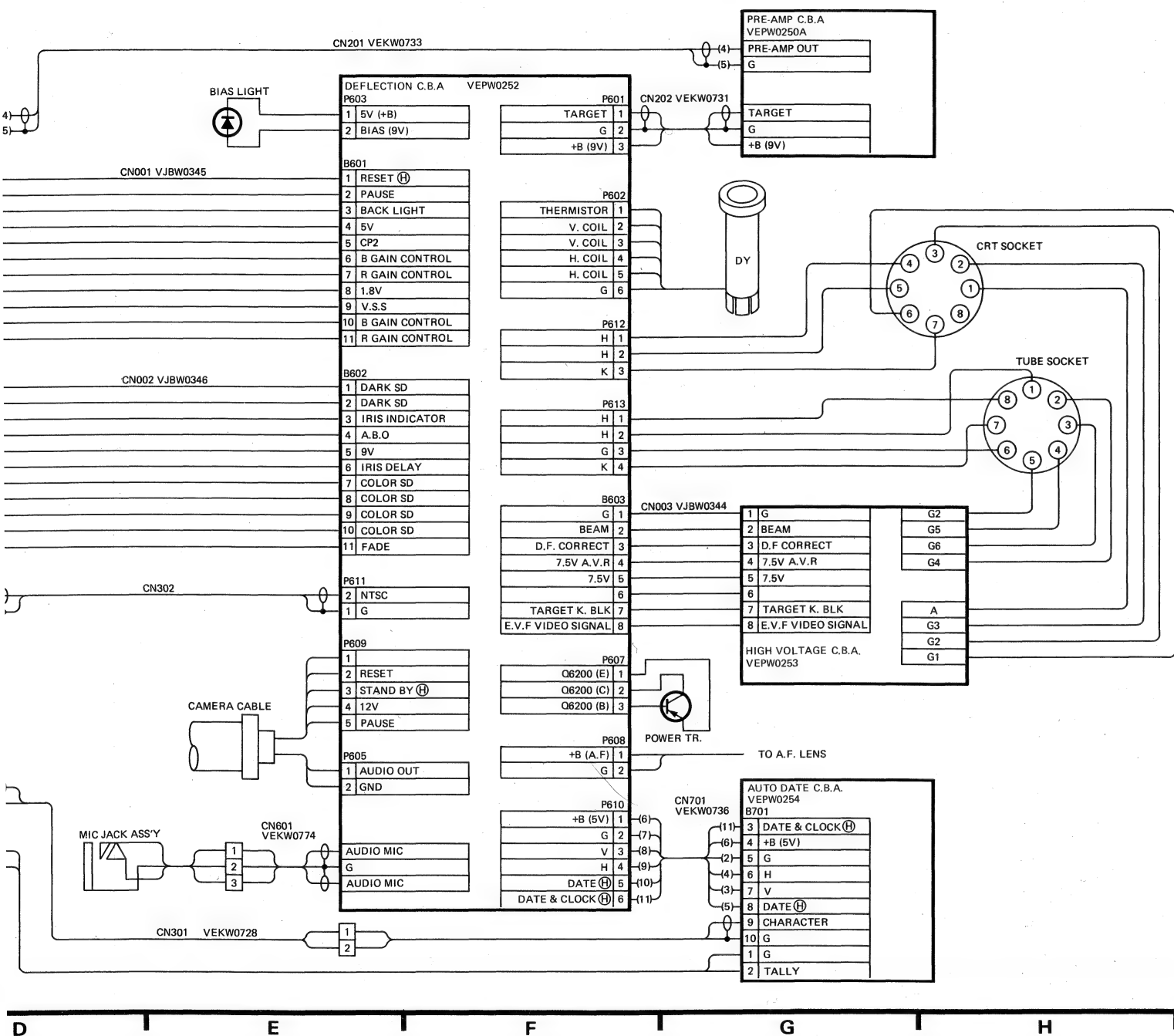


- 1 MYLAR CAPACITOR
- 2 NON POLARITY CAPACITOR
- 3 TANTALUM CAPACITOR



Soldering iron

C DIAGRAM



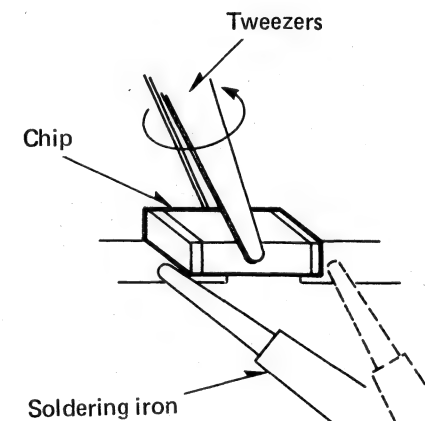
Chip Components

A. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF before replacing the chip.
2. Use tweezers to handle the chip to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of the chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron be used.
7. Solder with diameter of less than 0.5mm is recommended.
8. Do not heat the chip from more than 3 seconds.
9. Maintain the temperature under 260°C (500°F) when soldering.

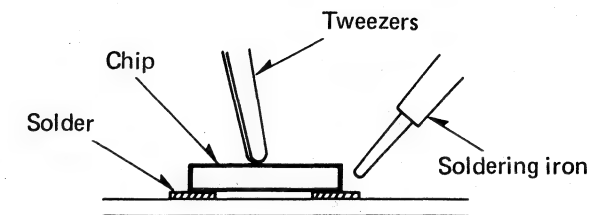
B. Removal

1. Add solder to both ends of the chip (three leads on the chip transistor).
 2. Holding the soldering iron to both ends of the chip (the three leads on the chip transistor) as shown below and remove the chip by turning it with the tweezers.
- Note: Be careful not to damage the other chips.

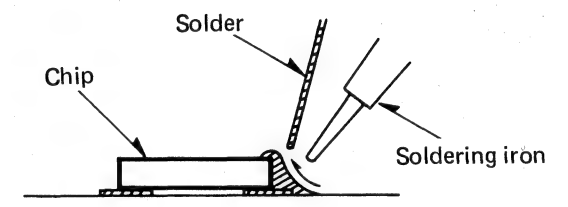


C. Mounting

1. Apply the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

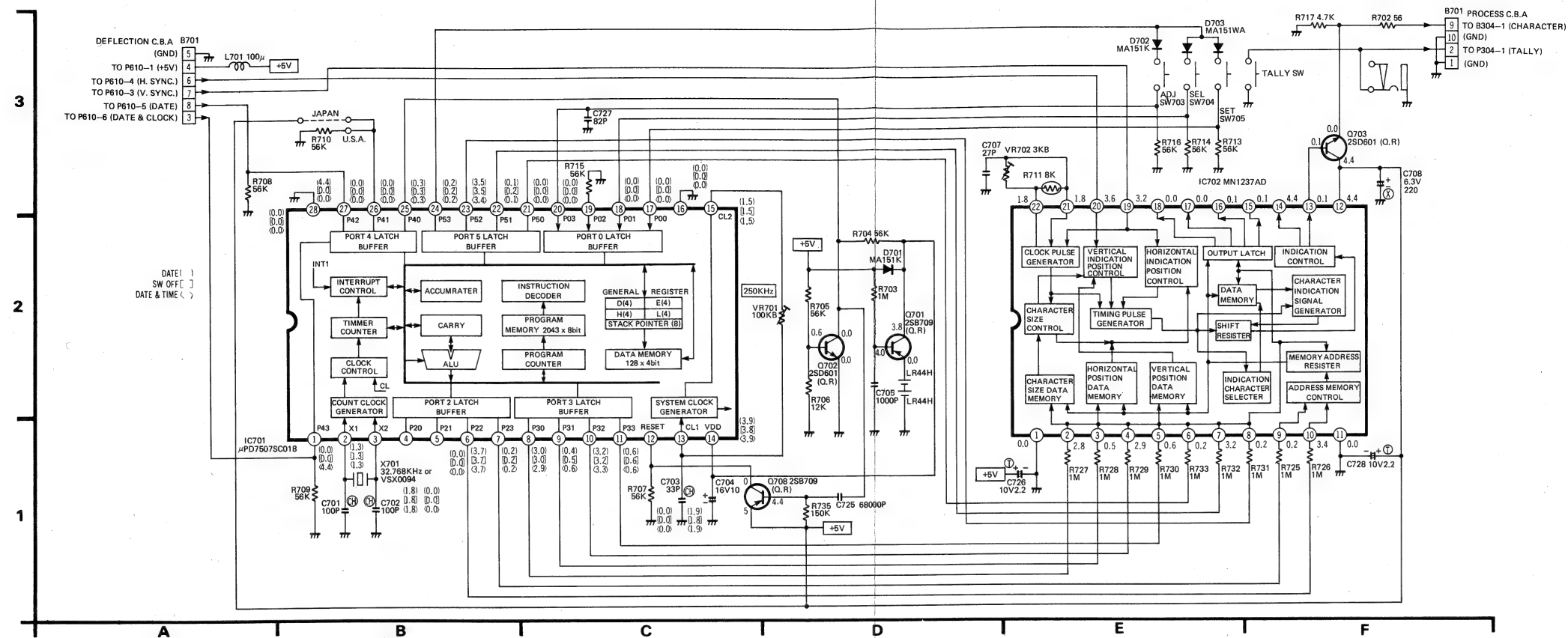


3. Solder both ends of the chip (three leads on the chip transistor).

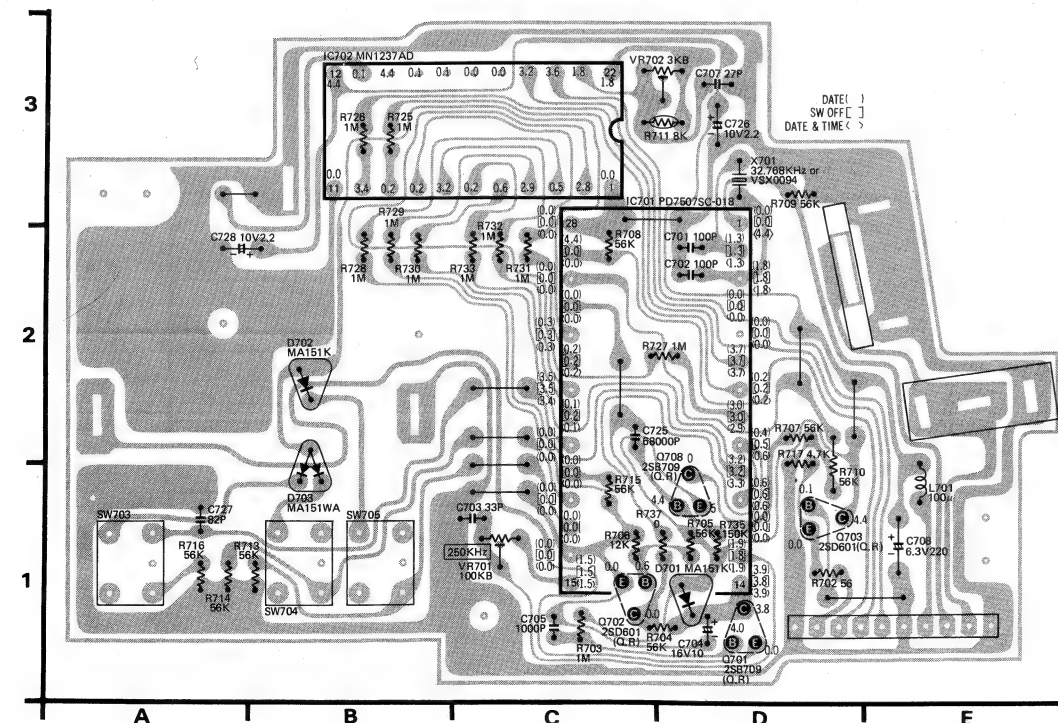


AUTO FOCUS MODEL ONLY

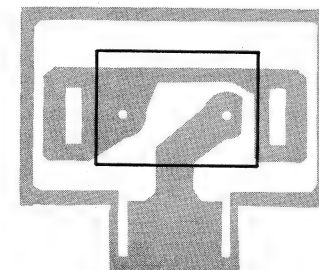
AUTO DATE SCHEMATIC DIAGRAM



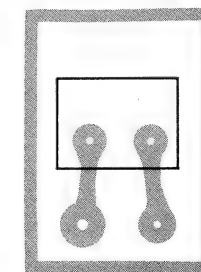
AUTO DATE CIRCUIT BOARD(VEPW0254)



TALLY SW.(B) C.B.A.
(VEPW0274)



TALLY SW. C.B.A.
(VEPW0281)



SPECIAL NOTE All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "Electrostatically Sensitive (ES) Devices" section of this service manual.

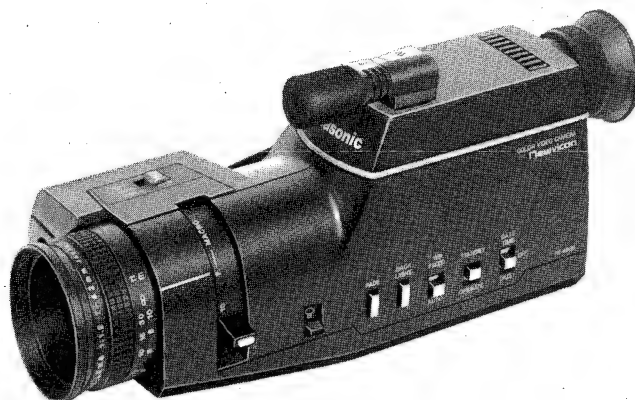
Service Manual

Color Video Camera

Vol. 5

Exploded Views
Replacement Parts List

PK-450B
PK-450S
PK-410

**PK-450B**

SPECIFICATIONS

Power Source: DC 12V \pm 10%
AC 120V \pm 10%, 60Hz \pm 0.5%
(with Power Supply Unit)

Power Consumption: DC 4.6W at 12V DC (Battery)
(5.0W with Auto Focus on)

Newvicon Tube
System: 1/3" frequency separation single tube
system (built-in stripe filter)

Single Carrier
Frequency: 3.58 MHz

Focus System: Electro-static type

Lens Mounting: Built-in zoom lens (not "C" mount)

Lens: 6:1 zoom lens with auto iris control
Power zoom lens and macro construction
F: 1.2, f: 7mm—42mm (Auto Focus)
d: 1.2m to infinity (Auto Focus)
F: 1.4, f: 8mm—48mm (Manual Focus)
d: 1.0m to infinity (Manual Focus)

Lens Diameter: 49mm

Light Sensitivity: Minimum light intensity on optical
image: 20 Lux (F: 1.2) (Auto Focus)
30 Lux (F: 1.4) (Manual Focus)
Optimum light intensity on optical
image: 900 Lux

Video Output Level: 1.0Vp-p, 75 Ω (standard NTSC signal)

Sync. System: Internal Sync: RS-170

Signal to Noise Ratio: More than 45dB

Horizontal Resolution: 260 lines

Color Temperature

Control: 2 step switch (indoor/outdoor) & Auto
adjust

Microphone: Condenser microphone

Audio Output Level: -20dB, Hi-impedance

Audio Output

Impedance: High impedance (1k Ω)

External Microphone

Input Impedance: 600 Ω unbalanced

Electronic Viewfinder: Mono chrome 1/2 inch CRT

Operating

Temperature: 5°C to 40°C

Operating Humidity: 10% to 75%

Operating Position: Normal position only

Weight:

Without handle grip

2.4 lbs (with lens, 7ft cable) (Auto Focus)

Without handle grip

2.0 lbs (with lens, 7ft cable) (Manual Focus)

AC adapter (option)

2.4 lbs

Dimensions:

10.2"(W) \times 3.7"(H) \times 4.3"(D) (Auto Focus)

258mm(W) \times 94mm(H) \times 110mm(D)

9.2"(W) \times 4.3"(H) \times 3.7"(D) (Manual Focus)

234mm(W) \times 110mm(H) \times 94mm(D)

Weight and dimensions shown are approximate.

Specifications are subject to change without notice.

Panasonic

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Corporation of America
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New Jersey 07094

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Division of Matsushita Electric
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Ave. 65 De Infanteria, KM 9.7
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Carolina, Puerto Rico 00630

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MANUAL FOCUS SECTION

EXPLODED VIEWS

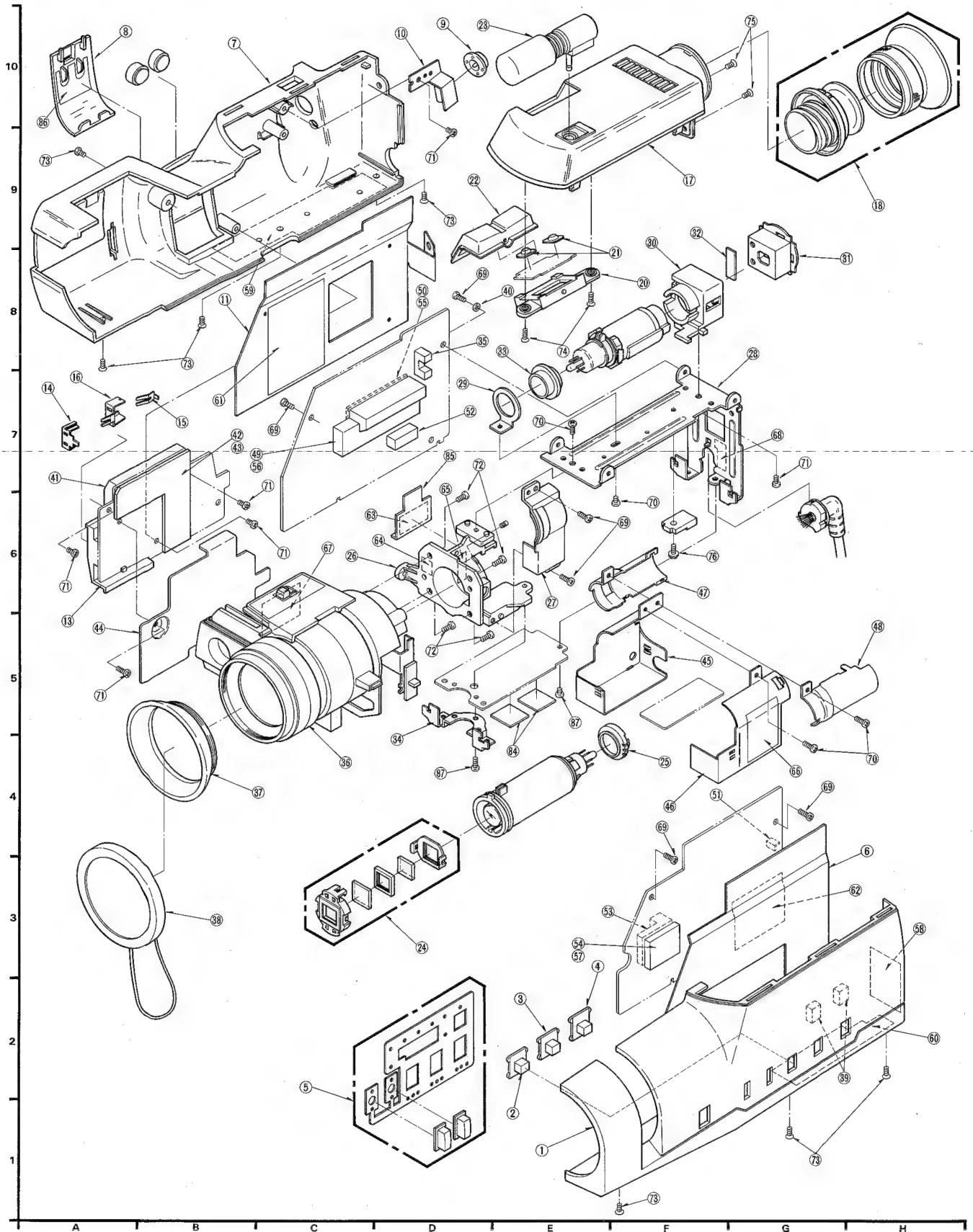
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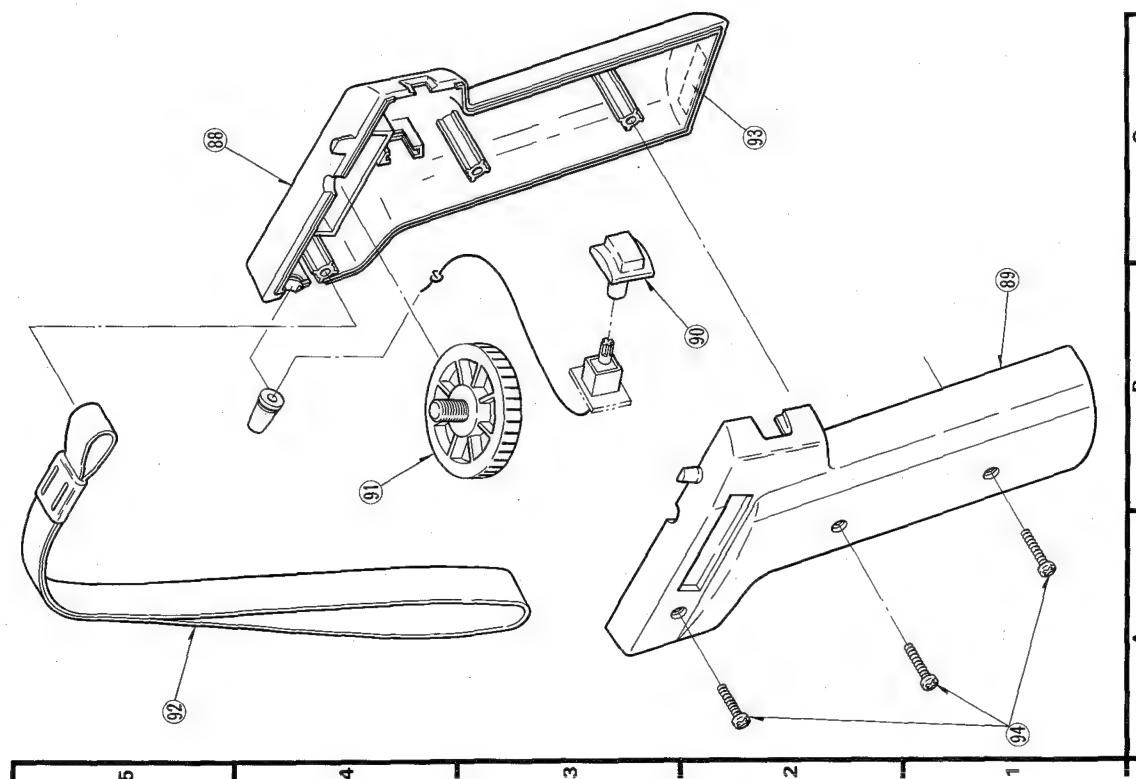
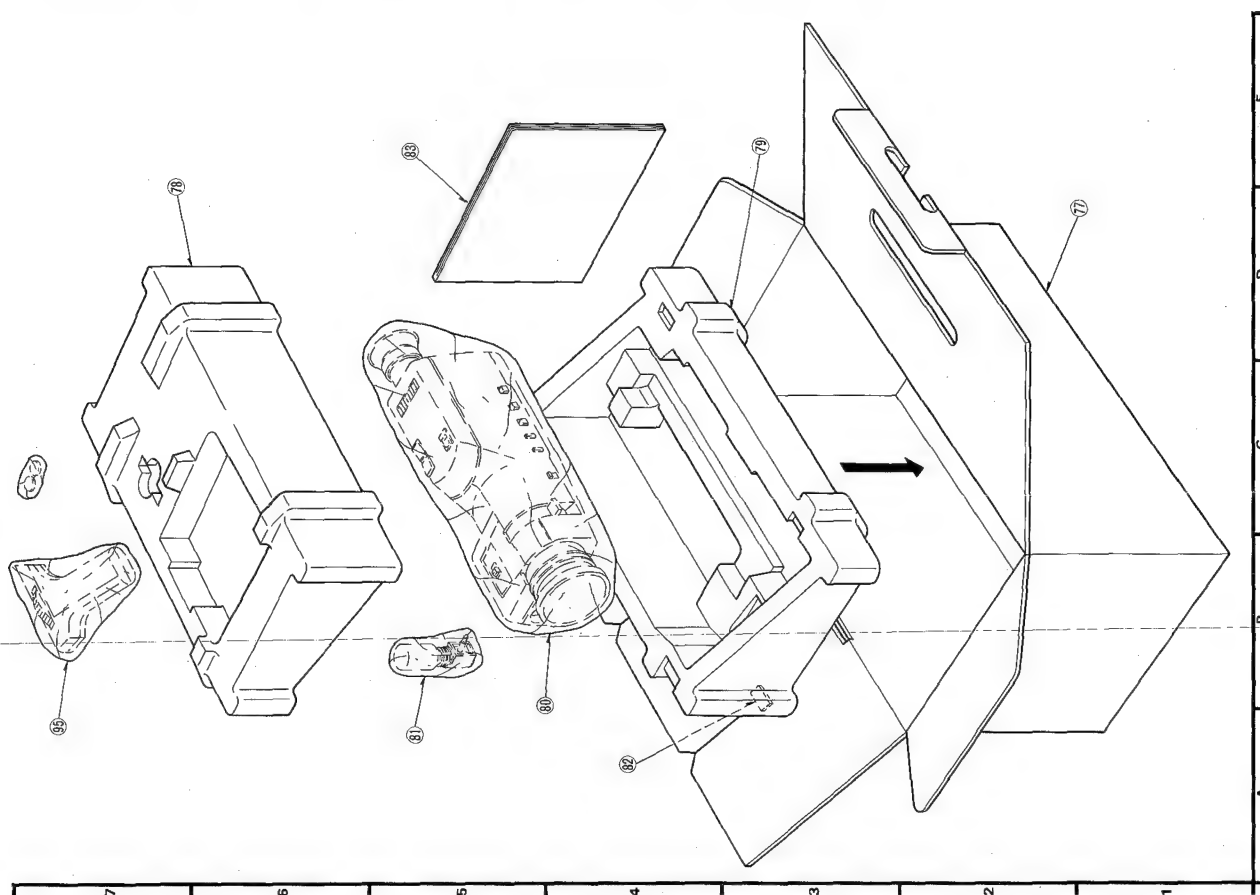
ELECTRICAL REPLACEMENT PARTS LIST (Camera Unit) 5-17

(AUTO FOCUS SECTION) **EXPLODED VIEW**

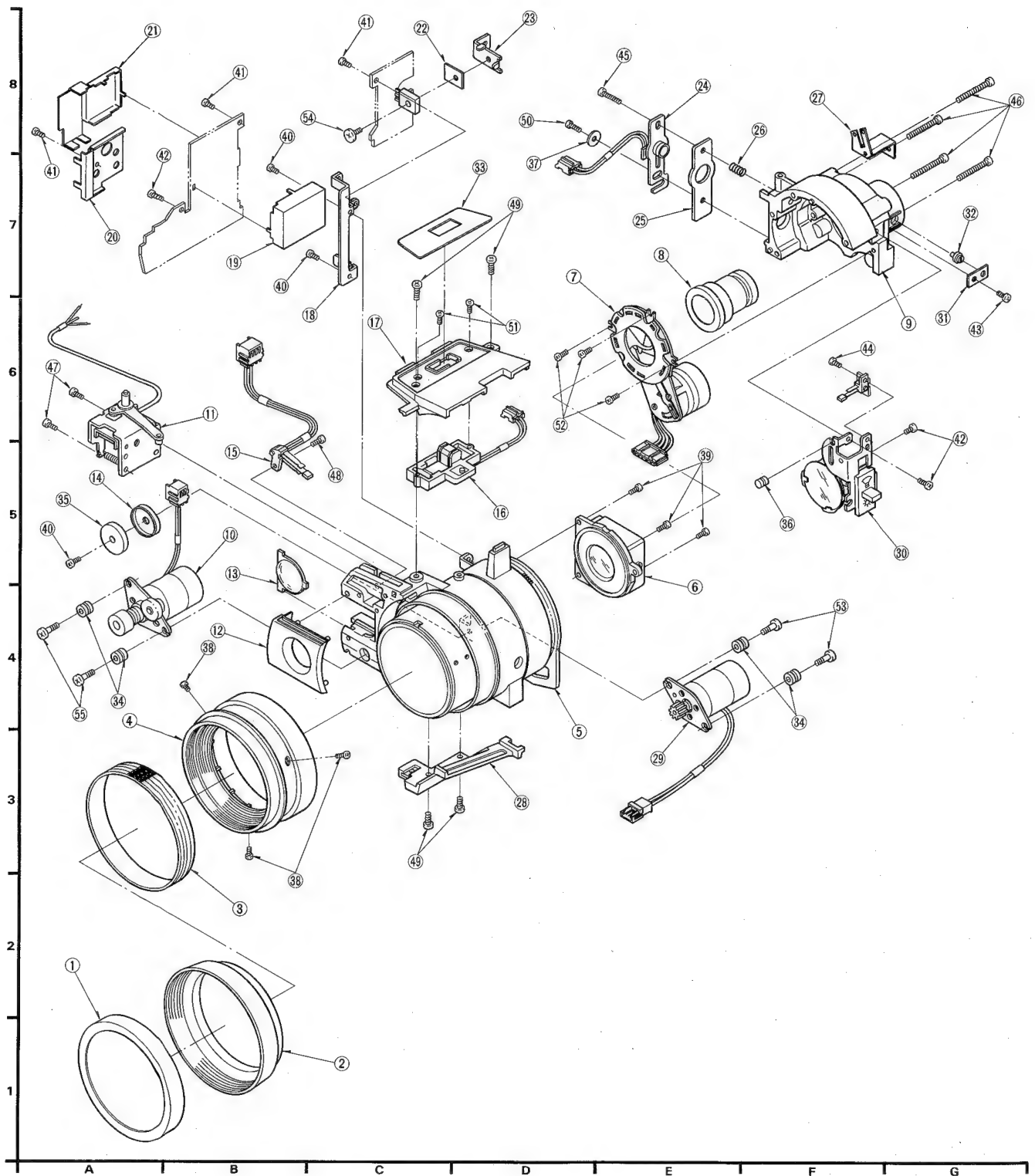
1 Camera Unit Section



2 Pistol Grip and Packing Parts Section



③ Auto Focus Lens Unit Section



Mechanical Replacement Parts List

Model No. PK-450B, PK-450S

Note: Be sure make your orders of replacement parts according to this list.

(B) = PK-450B (S) = PK-450S

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		C.S.U		
1	VKGW0519(B)	AF SIDE COVER (R)	1	
1	VKGW0518(S)	AF SIDE COVER (R)	1	
2	VGW0102(B)	AWB KNOB	1	
2	VGW0121(S)	AWB KNOB	1	
3	VGW0103(B)	STANDBY KNOB	1	
3	VGW0122(S)	STANDBY KNOB	1	
4	VGW0104(B)	AUTO DATE SELECTION KNOB	1	
4	VGW0123(S)	AUTO DATE SELECTION KNOB	1	
5	VXBW0003(B)	BUTTON PLATE ASS'Y	1	
5	VXBW0002(S)	BUTTON PLATE ASS'Y	1	
6	VMZW0132(B)	BARRIER (R)	1	
6	VMZW0132(S)	BARRIER (R)	1	
7	VYKW0571(B)	AF SIDE COVER (L) ASS'Y	1	
7	VYKW0569(S)	AF SIDE COVER (L) ASS'Y	1	
8	VKGW0463(B)	CELL CAP	1	
8	VKGW0462(S)	CELL CAP	1	
9	VGW0100(B)	TALLY BUTTON	1	
9	VGW0100(S)	TALLY BUTTON	1	
10	VMBW0045(B)	TALLY BUTTON PLATE	1	
10	VMBW0045(S)	TALLY BUTTON PLATE	1	
11	VMZW0133(B)	BARRIER (L)	1	
11	VMZW0133(S)	BARRIER (L)	1	
12	VMAW0185(B)	TALLY SW ANGLE	1	
12	VMAW0185(S)	TALLY SW ANGLE	1	
13	VMDW0053(B)	CELL TERMINAL HOLDER	1	
13	VMDW0053(S)	CELL TERMINAL HOLDER	1	
14	VMBW0050(B)	CELL TERMINAL (A)	1	
14	VMBW0050(S)	CELL TERMINAL (A)	1	
15	VMBW0051(B)	CELL TERMINAL (B)	1	
15	VMBW0051(S)	CELL TERMINAL (B)	1	
16	VMBW0059(B)	CELL TERMINAL (C)	1	
16	VMBW0059(S)	CELL TERMINAL (C)	1	
17	VYKW0674(B)	TOP COVER UNIT	1	
17	VYKW0673(S)	TOP COVER UNIT	1	
18	VYKW0533(B)	LENS HOLDER ASS'Y	1	
18	VYKW0533(S)	LENS HOLDER ASS'Y	1	
20	VMDW0052(B)	HOLDING PIECE	1	
20	VMDW0052(S)	HOLDING PIECE	1	
21	VMGW0052(B)	RUBBER SWITCH	2	
21	VMGW0052(S)	RUBBER SWITCH	2	
22	VGW0099(B)	ZOOM SWITCH KNOB	1	
22	VGW0099(S)	ZOOM SWITCH KNOB	1	
23	VXW0033(B)	MIC ASS'Y	1	
23	VXW0033(S)	MIC ASS'Y	1	
24	VXW0023(B)	FILTER ASS'Y	1	
24	VXW0023(S)	FILTER ASS'Y	1	
25	VMDW0051(B)	BIAS LIGHT HOLDER	1	
25	VMDW0051(S)	BIAS LIGHT HOLDER	1	
26	VMKW0041(B)	MAIN CHASSIS	1	
26	VMKW0041(S)	MAIN CHASSIS	1	
27	VMKW0042(B)	CHASSIS COVER	1	
27	VMKW0042(S)	CHASSIS COVER	1	
28	VMAW0175(B)	SUB CHASSIS	1	
28	VMAW0175(S)	SUB CHASSIS	1	
29	VMAW0177(B)	CRT FIXING ANGLE	1	
29	VMAW0177(S)	CRT FIXING ANGLE	1	
30	VKGW0427(B)	CRT HOLDER	1	
30	VKGW0427(S)	CRT HOLDER	1	
31	VMAW0178(B)	CRT PROTECTION PLATE	1	
31	VMAW0178(S)	CRT PROTECTION PLATE	1	
32	VGLW0003(B)	LED SHEET	1	
32	VGLW0003(S)	LED SHEET	1	
33	VMGW0016(B)	CRT FIXING BUSH	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
33	VMGW0016(S)	CRT FIXING BUSH	1	
34	VMAW0176(B)	P.C.B. FIXING ANGLE	1	
34	VMAW0176(S)	P.C.B. FIXING ANGLE	1	
35	VMXW0063(B)	LED SPACER	1	
35	VMXW0063(S)	LED SPACER	1	
36	VFLW0070(B)	X6 AUTO FOCUS LENS	1	
36	VFLW0070(S)	X6 AUTO FOCUS LENS	1	
37	VKUW0050(B)	LENS HOOD	1	
37	VKUW0050(S)	LENS HOOD	1	
38	VXJW0007(B)	HOOD CAP ASS'Y	1	
38	VXJW0007(S)	HOOD CAP ASS'Y	1	
39	VMGW0071(S)	SIDE COVER CUSHION	2	
39	VMGW0071(B)	SIDE COVER CUSHION	2	
40	VMGW3X8X0.5	FIBER WASHER	1	
40	VMGW3X8X0.5	FIBER WASHER	1	
88	VKHW0053(B)	GRIP (R)	1	
88	VKHW0053(S)	GRIP (R)	1	
89	VKHW0054(B)	GRIP (L)	1	
89	VKHW0054(S)	GRIP (L)	1	
90	VGW0117(B)	TALLY SW BUTTON	1	
90	VGW0117(S)	TALLY SW BUTTON	1	
91	VKGW0069(B)	HANDLE ROLLER	1	
91	VKGW0069(S)	HANDLE ROLLER	1	
92	VFBW0014(B)	HAND STRAP	1	
92	VFBW0014(S)	HAND STRAP	1	
		CASE		
41	VSCW0104(B)	AUTO DATE SHIELD CASE (A)	1	
41	VSCW0104(S)	AUTO DATE SHIELD CASE (A)	1	
42	VSCW0105(B)	AUTO DATE SHIELD CASE (B)	1	
42	VSCW0105(S)	AUTO DATE SHIELD CASE (B)	1	
43	VMZW0118(B)	AUTO DATE BARRIER (A)	1	
43	VMZW0118(S)	AUTO DATE BARRIER (A)	1	
44	VMZW0143(B)	AUTO DATE BARRIER (B)	1	
44	VMZW0143(S)	AUTO DATE BARRIER (B)	1	
45	VSCW0100(B)	PRE-AMP SHIELD CASE (A)	1	
45	VSCW0100(S)	PRE-AMP SHIELD CASE (A)	1	
46	VSCW0101(B)	PRE-AMP SHIELD CASE (B)	1	
46	VSCW0101(S)	PRE-AMP SHIELD CASE (B)	1	
47	VSCW0102(B)	SOCKET SHIELD CASE (A)	1	
47	VSCW0102(S)	SOCKET SHIELD CASE (A)	1	
48	VSCW0103(B)	SOCKET SHIELD CASE (B)	1	
48	VSCW0103(S)	SOCKET SHIELD CASE (B)	1	
49	VSCW0124(B)	SYNC SHIELD CASE (A)	1	
49	VSCW0124(S)	SYNC SHIELD CASE (A)	1	
50	VSCW0125(B)	SYNC SHIELD CASE (B)	1	
50	VSCW0125(S)	SYNC SHIELD CASE (B)	1	
51	VSCW0128(B)	COIL SHIELD PLATE	1	
51	VSCW0128(S)	COIL SHIELD PLATE	1	
52	VSCW0129(B)	DL SHIELD PLATE	1	
52	VSCW0129(S)	DL SHIELD PLATE	1	
53	VSCW0126(B)	AUDIO SHIELD CASE (A)	1	
53	VSCW0126(S)	AUDIO SHIELD CASE (A)	1	
54	VSCW0127(B)	AUDIO SHIELD CASE (B)	1	
54	VSCW0127(S)	AUDIO SHIELD CASE (B)	1	
55	VMZW0129(B)	SYNC BARRIER (A)	1	
55	VMZW0129(S)	SYNC BARRIER (A)	1	
56	VMZW0130(B)	SYNC BARRIER (B)	1	
56	VMZW0130(S)	SYNC BARRIER (B)	1	
57	VMZW0131(B)	AUDIO BARRIER	1	
57	VMZW0131(S)	AUDIO BARRIER	1	
84	VMZW0164(B)	GROUND BARRIER	2	
84	VMZW0164(S)	GROUND BARRIER	2	
85	VMZW0161(B)	CONNECTOR BARRIER	1	
85	VMZW0161(S)	CONNECTOR BARRIER	1	
86	VMZW0165(B)	CELL CAP LABEL	1	
86	VMZW0165(S)	CELL CAP LABEL	1	
		LABEL		
58	VQLW0632(B)	CAUTION LABEL (C)	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Diode		
D201	MA165		1	
		Resistors		
R201	ERD25TJ565	Resistor 1/4W 5.6M	1	
R202	ERJ6GJYJ511M	Chip 510	1	
R203	ERO25CKG2704	2.7M	1	
R204	ERJ6GJYJ181M	Chip 180	1	
R205	ERJ6GJYJ682M	Chip 6.8K	1	
R206	ERJ6GJYJ222M	Chip 2.2K	1	
R207	ERJ6GJYJ241M	Chip 240	1	
R208	ERDS2TJ273	Resistor 1/4W 27K	1	
R209	ERDS2TJ222	Resistor 1/4W 2.2K	1	
R210	ERDS2TJ221	Resistor 1/4W 220	1	
R211	ERJ6GJYJ104M	Chip 100K	1	
R212	ERDS2TJ152	Resistor 1/4W 1.5K	1	
R213	ERJ6GJYJ124M	Chip 120K	1	
R214	ERJ6GJYJ682M	Chip 6.8K	1	
R215	ERJ6GJYJ623M	Chip 62K	1	
R216	ERJ6GJYJ122M	Chip 1.2K	1	
R217	ERJ6GJYJ332M	Chip 3.3K	1	
R218	ERJ6GJYJ750M	Chip 75	1	
		Capacitors		
C201,202	ECUM1E1042FN	Chip Ceramic 25V 0.1	2	
C203	ECEA1AF470	Electrolytic 10V 47	1	
C204	ECCF1H020CC5	Ceramic 50V 2P	1	
C205	ECQE1104KN	Mylar 100V 0.1	1	
C206	ECEA0JKS470	Electrolytic 6.3V 47	1	
C207,208	ECSP0JE106	Tantalum 6.3V 10	2	
C209	ECUM1E1042FN	Chip Ceramic 25V 0.1	1	
C210	ECSP1AE475	Tantalum 10V 4.7	1	
C211	ECCF1H080DC5	Ceramic 50V 8P	1	
C212	ECR-GB050M11	Trimmer 50P	1	
C213	ECCF1H220JC	Ceramic 50V 22P	1	
		Coils		
L201	ELT12R021	Percival Coil 430uH	1	
L202	EL0405SR100K	10uH	1	
		Miscellaneous		
CN201	VEKW0733	3P Connector Ass'y	1	
CN202	VEKW0731-1	2P Connector Ass'y	1	
	VEPW0251	Process C.B.A.		
		Integrated Circuits		
IC301	AN2133		1	
IC302	AN2241		1	
IC303	AN2431		1	
IC304	AN2331		1	
IC305	AN2141		1	
IC306	MN6064RS		1	
IC307	NJM2904M		1	
IC309	UPD4027BG		1	
IC310	AN2340		1	
IC311	AN2341		1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		LC Filters		
LC301	ELB4H008		1	
LC302	ELB4M009		1	
LC303	ELB4K011		1	
LC304,305	ELB4H011		2	
		Delay Lines		
DL301	EFDMT645B85T		1	
DL302	ELB4K012		1	
DL303	EFDVN645B15C		1	
		Crystal		
X301	VSWW0013		1	
		Diodes		
D301	MA27W-A		1	
D302	MA151K	Chip	1	
D304,305	MA165		2	
D306	0A90AR		1	
D307	MA151K	Chip	1	
D308	MZ303A		1	
D309	MA165		1	
D310	MA27A		1	
D311,312	0A90AR		2	
D314	0A90AR		1	
D315	MA165		1	
D316	MZ303A		1	
D317	MA165		1	
D318	1SV73		1	
D319	MA165		1	
D320	TLG102-A	Tally Lamp	1	
D321	TLO102-A	Filter Lamp	1	
D324	0A90AR		1	
D325	MA165		1	
		Transistors		
Q301	2SD601(Q,R)	Chip	1	
Q302,303	2SB709(Q,R)	Chip	2	
Q304	2SB641(Q,R)		1	
Q305	2SC2405	Chip	1	
Q306	2SD601(Q,R)	Chip	1	
Q307	2SB709(Q,R)	Chip	1	
Q308-311	2SD601(Q,R)	Chip	4	
Q312	2SC2404C	Chip	1	
Q317,318	2SD601(Q,R)	Chip	2	
Q319-321	2SD636(Q,R)		3	
Q323	2SD601(Q,R)	Chip	1	
Q324	2SC2295C	Chip	1	
Q325	2SA1022B	Chip	1	
Q326	2SD636(Q,R)		1	
Q330	2SD636(Q,R)		1	
Q333-336	2SD601(Q,R)	Chip	4	
Q338	2SD601(Q,R)	Chip	1	
Q339	2SD601(Q,R)	Chip	1	
Q340	2SB709(Q,R)	Chip	1	
Q343	2SD601(Q,R)	Chip	1	
Q345	2SB709(Q,R)	Chip	1	
Q346	2SB641(Q,R)		1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Resistors		
R301	ERJ6GCVJ472M	Chip 4.7K	1	
R302	ERJ6GCVJ563M	Chip 56K	1	
R303,304	ERJ6GCVJ102M	Chip 1K	2	
R305	ERJ6GCVJ153M	Chip 15K	1	
R306	ERJ6GCVJ563M	Chip 56K	1	
R307	ERJ6GCV0R00	Chip 0	1	
R308	ERJ6GCVJ103M	Chip 10K	1	
R309	ERJ6GCVJ332M	Chip 3.3K	1	
R310	ERJ6GCVJ563M	Chip 56K	1	
R311	ERTD2FHL332S	Thermistor 3.3K	1	
R312	ERJ6GCVJ102M	Chip 1K	1	
R313	ERJ6GCVJ122M	Chip 1.2K	1	
R314	ERJ6GCVJ272M	Chip 2.7K	1	
R315	ERJ6GCVJ182M	Chip 1.8K	1	
R316	ERJ6GCVJ561M	Chip 560	1	
R317	ERJ6GCVJ273M	Chip 27K	1	
R318	ERJ6GCVJ222M	Chip 2.2K	1	
R319	ERJ6GCVJ153M	Chip 15K	1	
R320	ERJ6GCVJ222M	Chip 2.2K	1	
R321	ERJ6GCVJ223M	Chip 22K	1	
R322	ERJ6GCVJ562M	Chip 5.6K	1	
R323	ERJ6GCVJ563M	Chip 56K	1	
R324	ERJ6GCVJ473M	Chip 47K	1	
R325	ERJ6GCVJ222M	Chip 2.2K	1	
R326	ERJ6GCVJ102M	Chip 1K	1	
R327	ERJ6GCVJ331M	Chip 330	1	
R328	ERJ6GCVJ102M	Chip 1K	1	
R329	ERJ6GCVJ682M	Chip 6.8K	1	
R330	ERJ6GCVJ153M	Chip 15K	1	
R331	ERJ6GCVJ152M	Chip 1.5K	1	
R332	ERJ6GCVJ472M	Chip 4.7K	1	
R333	ERJ6GCVJ563M	Chip 56K	1	
R334	ERJ6GCVJ273M	Chip 27K	1	
R335	ERJ6GCVJ562M	Chip 5.6K	1	
R336,337	ERJ6GCVJ223M	Chip 22K	2	
R338	ERJ6GCVJ102M	Chip 1K	1	
R339	ERJ6GCVJ433M	Chip 43K	1	
R340	ERJ6GCVJ223M	Chip 22K	1	
R341	ERJ6GCVJ222M	Chip 2.2K	1	
R342	ERJ6GCVJ683M	Chip 68K	1	
R343	ERDS2TJ393	Resistor 39K	1	
R344	ERJ6GCVJ103M	Chip 10K	1	
R345	ERJ6GCVJ683M	Chip 68K	1	
R346	ERJ6GCVJ182M	Chip 1.8K	1	
R347	ERJ6GCVJ153M	Chip 15K	1	
R348	ERJ6GCVJ333M	Chip 33K	1	
R349	ERJ6GCVJ222M	Chip 2.2K	1	
R350,351	ERJ6GCVJ561M	Chip 560	2	
R364	ERJ6GCVJ104M	Chip 100K	1	
R365	ERJ6GCVJ104M	Chip 100K	1	
R366	ERJ6GCVJ184M	Chip 180K	1	
R367	ERJ6GCVJ334M	Chip 330K	1	
R368-373	ERJ6GCVJ103M	Chip 10K	6	
R374,375	ERJ6GCVJ152M	Chip 1.5K	2	
R376,377	ERJ6GCVJ153M	Chip 15K	2	
R378	ERJ6GCVJ473M	Chip 47K	1	
R379,380	ERJ6GCVJ153M	Chip 15K	2	
R381	ERJ6GCVJ473M	Chip 47K	1	
R382,383	ERJ6GCVJ103M	Chip 10K	2	
R384,385	ERJ6GCVJ102M	Chip 1K	2	
R386	ERJ6GCVJ471M	Chip 470	1	
R387	ERJ6GCVJ152M	Chip 1.5K	1	
R388	ERJ6GCVJ681M	Chip 680	1	
R389	ERJ6GCVJ562M	Chip 5.6K	1	
R390	ERJ6GCVJ104M	Chip 100K	1	
R391	ERJ6GCVJ471M	Chip 470	1	
R392	ERJ6GCVJ102M	Chip 1K	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
R393	ERJ6GCVJ224M	Chip 220K	1	
R394,395	ERJ6GCVJ103M	Chip 10K	2	
R396	ERJ6GCVJ682M	Chip 6.8K	1	
R397	ERJ6GCVJ822M	Chip 8.2K	1	
R398	ERJ6GCVJ100M	Chip 10	1	
R399	ERJ6GCVJ822M	Chip 8.2K	1	
R3100	ERJ6GCVJ103M	Chip 10K	1	
R3101	ERJ6GCVJ822M	Chip 8.2K	1	
R3102	ERJ6GCVJ392M	Chip 3.9K	1	
R3103	ERJ6GCVJ822M	Chip 8.2K	1	
R3104	ERJ6GCVJ182M	Chip 1.8K	1	
R3105	ERJ6GCVJ682M	Chip 6.8K	1	
R3106	ERJ6GCVJ103M	Chip 10K	1	
R3107	ERJ6GCVJ822M	Chip 8.2K	1	
R3108	ERJ6GCVJ561M	Chip 560	1	
R3109	ERJ6GCVJ122M	Chip 1.2K	1	
R3110	ERJ6GCVJ102M	Chip 1K	1	
R3111	ERJ6GCVJ271M	Chip 270	1	
R3112	ERJ6GCVJ222M	Chip 2.2K	1	
R3113	ERJ6GCVJ102M	Chip 1K	1	
R3114	ERJ6GCVJ271M	Chip 270	1	
R3115	ERJ6GCVJ222M	Chip 2.2K	1	
R3116	ERJ6GCVJ682M	Chip 6.8K	1	
R3117	ERJ6GCVJ122M	Chip 1.2K	1	
R3118	ERJ6GCVJ154M	Chip 150K	1	
R3119	ERJ6GCVJ104M	Chip 100K	1	
R3120	ERJ6GCVJ154M	Chip 150K	1	
R3121	ERJ6GCVJ103M	Chip 10K	1	
R3122	ERJ6GCVJ222M	Chip 2.2K	1	
R3123	ERJ6GCVJ102M	Chip 1K	1	
R3124	ERJ6GCVJ104M	Chip 100K	1	
R3125	ERJ6GCVJ123M	Chip 12K	1	
R3126	ERJ6GCVJ334M	Chip 330K	1	
R3127	ERJ6GCVJ103M	Chip 10K	1	
R3128	ERJ6GCVJ472M	Chip 4.7K	1	
R3129	ERJ6GCVJ334M	Chip 330K	1	
R3130	ERJ6GCVJ473M	Chip 47K	1	
R3131	ERJ6GCVJ562M	Chip 5.6K	1	
R3133	ERJ6GCVJ153M	Chip 15K	1	
R3137	ERJ6GCVJ222M	Chip 2.2K	1	
R3138	ERJ6GCVJ472M	Chip 4.7K	1	
R3139	ERJ6GCVJ562M	Chip 5.6K	1	
R3146	ERJ6GCVJ223M	Chip 22K	1	
R3147	ERJ6GCVJ392M	Chip 3.9K	1	
R3148	ERJ6GCVJ561M	Chip 560	1	
R3149	ERJ6GCVJ563M	Chip 56K	1	
R3150	ERJ6GCVJ223M	Chip 22K	1	
R3151	ERJ6GCVJ224M	Chip 220K	1	
R3152	ERJ6GCVJ223M	Chip 22K	1	
R3153	ERJ6GCVJ224M	Chip 220K	1	
R3154	ERJ6GCVJ472M	Chip 4.7K	1	
R3162,3163	ERJ6GCVJ224M	Chip 220K	2	
R3164	ERJ6GCVJ563M	Chip 56K	1	
R3165	ERJ6GCVJ103M	Chip 10K	1	
R3166	ERJ6GCVJ563M	Chip 56K	1	
R3167	ERJ6GCVJ103M	Chip 10K	1	
R3168,3169	ERJ6GCVJ563M	Chip 56K	2	
R3170	ERJ6GCVJ472M	Chip 4.7K	1	
R3171	ERJ6GCVJ562M	Chip 5.6K	1	
R3172	ERJ6GCVJ103M	Chip 10K	1	
R3173	ERJ6GCVJ562M	Chip 5.6K	1	
R3174	ERJ6GCVJ682M	Chip 6.8K	1	
R3175-3177	ERJ6GCVJ103M	Chip 10K	3	
R3178,3179	ERJ6GCVJ473M	Chip 47K	2	
R3181	ERJ6GCVJ222M	Chip 2.2K	1	
R3182	ERJ6GCVJ472M	Chip 4.7K	1	
R3183	ERJ6GCVJ332M	Chip 3.3K	1	
R3184	ERJ6GCVJ472M	Chip 4.7K	1	
R3185	ERJ6GCVJ222M	Chip 2.2K	1	
R3186	ERJ6GCVJ104M	Chip 100K	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
R3187	ERJ6GCTJ102M	Chip	1K	1
R3188	ERJ6GCTJ103M	Chip	10K	1
R3189	ERJ6GCTJ102M	Chip	1K	1
R3190	ERJ6GCTJ103M	Chip	10K	1
R3191	ERJ6GCTJ272M	Chip	2.7K	1
R3192	ERJ6GCTJ560M	Chip	56	1
R3193	ERJ6GCTJ561M	Chip	560	1
R3194	ERJ6GCTJ104M	Chip	100K	1
R3195	ERJ6GCTJ154M	Chip	150K	1
R3196	ERJ6GCTJ221M	Chip	220	1
R3197	ERJ6GCTJ153M	Chip	15K	1
R3198	ERJ6GCTJ223M	Chip	22K	1
R3199, 3200	ERJ6GCTJ472M	Chip	4.7K	2
R3201	ERTD2FHL503S	Thermistor	50K	1
R3202	ERJ6GCTJ153M	Chip	15K	1
R3203	ERJ6GCTJ473M	Chip	47K	1
R3204	ERJ6GCTJ103M	Chip	10K	1
R3206	ERJ6GCTJ560M	Chip	56	1
R3207	ERJ6GCTJ562M	Chip	5.6K	1
R3208	ERJ6GCTJ272M	Chip	2.7K	1
R3209	ERJ6GCTJ103M	Chip	10K	1
R3212	ERJ6GCTJ473M	Chip	47K	1
R3213, 3214	ERJ6GCTJ102M	Chip	1K	2
R3215	ERJ6GCTJ183M	Chip	18K	1
R3216	ERJ6GCTJ681M	Chip	680	1
R3217	ERJ6GCTJ331M	Chip	330	1
R3218	ERJ6GCTJ472M	Chip	4.7K	1
R3223, 3224	ERDS2T-OT	Resistor	0	2
R3225	ERDS2TJ473	Resistor	1/4W 47K	1
R3226	ERDS2TJ223	Resistor	1/4W 22K	1
R3227	ERDS2TJ273	Resistor	1/4W 27K	1
R3228	ERDS2TJ153	Resistor	1/4W 15K	1
R3229	ERDS2TJ103	Resistor	1/4W 10K	1
R3230	ERDS2TJ182	Resistor	1/4W 1.8K	1
R3231	ERDS2TJ393	Resistor	1/4W 39K	1
		Variable Resistors		
VR301	EVML4GA00B34		30KB	1
VR302	EVML4GA00B15		100KB	1
VR303	EVML4GA00B13		1KB	1
VR304	EVML4GA00B14		10KB	1
VR305	EVML4GA00B52		500B	1
VR306	EVML4GA00B33		3KB	1
VR307	EVML4GA00B24		20KB	1
VR308, 309	EVML4GA00B33		3KB	2
VR310-315	EVML4GA00B14		10KB	6
VR316, 317	EVML4GA00B33		3KB	2
VR318	EVML4GA00B14		10KB	1
VR319, 320	EVML4GA00B23		2KB	2
VR321	EVML4GA00B14		10KB	1
		Capacitors		
C301	ECUM1H103KBN	Chip Ceramic 50V	10000P	1
C302	ECSF0JE106	Tantalum 6.3V	10	1
C303	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C304	ECEA0JKS470	Electrolytic 6.3V	47	1
C305	ECSF1AE106	Tantalum 10V	10	1
C306	ECSF1CD104	Tantalum 16V	0.1	1
C307	ECUM1H560KCN	Chip Ceramic 50V	56P	1
C308	ECEA1CKS100	Electrolytic 16V	10	1
C309	ECEA0JKS470	Electrolytic 6.3V	47	1
C310	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C312	ECEA1EKN3R3	Electrolytic 25V	3.3	1
C313	ECSF1CD105	Tantalum 16V	1	1
C315	ECUM1H222KBN	Chip Ceramic 50V	2200P	1
C316	ECSF1AE476	Tantalum 10V	47	1

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
C318	ECEA1CKS100	Electrolytic 16V	10	1
C319	ECEA1HKNR47	Electrolytic 50V	0.47	1
C320	ECEA1CKS100	Electrolytic 16V	10	1
C321	ECEA1HKNR47	Electrolytic 50V	0.47	1
C322	ECUM1H390JCN	Chip Ceramic 50V	39P	1
C323	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C324	ECEA1CKN100	Electrolytic 16V	10	1
C325	ECEA1CKS100	Electrolytic 16V	10	1
C326	ECV1ZW20X64	Trimmer 1W	20P	1
C327, 328	ECUM1H103KBN	Chip Ceramic 50V	10000P	2
C329	ECUM1H100DCN	Chip Ceramic 50V	10P	1
C330	ECUM1H103KBN	Chip Ceramic 50V	10000P	1
C331	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C332	ECUM1H680KCN	Chip Ceramic 50V	68P	1
C333	ECEA0JKS470	Electrolytic 6.3V	47	1
C335	ECEA0JKS470	Electrolytic 6.3V	47	1
C336	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C337	ECUM1H100DCN	Chip Ceramic 50V	10P	1
C338	ECUM1H103KBN	Chip Ceramic 50V	10000P	1
C339	ECSF1AE106	Tantalum 10V	10	1
C340	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C341	ECUM1H820KN	Chip Ceramic 50V	82P	1
C342, 343	ECUM1H050DN	Chip Ceramic 50V	5P	2
C344	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C345	ECUM1H820KN	Chip Ceramic 50V	82P	1
C346	ECUM1H101KN	Chip Ceramic 50V	100P	1
C347	ECUM1H220KCN	Chip Ceramic 50V	22P	1
C348	ECUM1H331KCN	Chip Ceramic 50V	330P	1
C349	ECUM1H151KCN	Chip Ceramic 50V	150P	1
C350	ECUM1H270KCN	Chip Ceramic 50V	27P	1
C351	ECSF1AE106	Tantalum 10V	10	1
C352	ECSF1CD684	Tantalum 16V	0.68	1
C353	ECSF1CD104	Tantalum 16V	0.1	1
C354	ECUM1H101KN	Chip Ceramic 50V	100P	1
C355	ECUM1H390KCN	Chip Ceramic 50V	39P	1
C356	ECEA0JK221X	Electrolytic 6.3V	220	1
C357	ECUM1H180KCN	Chip Ceramic 50V	18P	1
C358	ECV1ZW40X53N	Trimmer 1W	40P	1
C359	ECSF0JE106	Tantalum 6.3V	10	1
C360	ECUM1H103KBN	Chip Ceramic 50V	10000P	1
C361	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C362	ECUM1H103KBN	Chip Ceramic 50V	10000P	1
C363	ECEA0JKS470	Electrolytic 6.3V	47	1
C364-367	ECUM1H103KBN	Chip Ceramic 50V	10000P	4
C368	ECSF1AE106	Tantalum 10V	10	1
C371	ECEA1CKS100	Electrolytic 16V	10	1
C372	ECUM1H271KN	Chip Ceramic 50V	270P	1
C375	ECEA1CKS100	Electrolytic 16V	10	1
C376	ECEA0JKS470	Electrolytic 6.3V	47	1
C377	ECEA1CKS100	Electrolytic 16V	10	1
C378	ECSF1CD474	Tantalum 16V	0.47	1
C379, 380	ECUM1E104ZFN	Chip Ceramic 25V	0.1	2
C384	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C385, 386	ECUM1H102KBN	Chip Ceramic 50V	1000P	2
C387	ECEA1CKS100	Electrolytic 16V	10	1
C388	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1
C389	ECEA0JK221X	Electrolytic 6.3V	220	1
C390	ECSF1CD474	Tantalum 16V	0.47	1
C391	ECEA1HKS3R3	Electrolytic 50V	3.3	1
C392, 393	ECEA1CKS100	Electrolytic 16V	10	2
C394	ECEA1HKS3R3	Electrolytic 50V	3.3	1
C395	ECSF1AD225	Tantalum 10V	2.2	1
C396	ECEA1HKS2R2	Electrolytic 50V	2.2	1
C397	ECEA1CKS100	Electrolytic 16V	10	1
C398	ECUM1H270KCN	Chip Ceramic 50V	27P	1
C399	ECEA1HKS010	Electrolytic 50V	1	1
C3100, 3101	ECEA1HKNR47	Electrolytic 50V	0.47	2
C3102	ECEA1CKS100	Electrolytic 16V	10	1
C3103	ECEA1HKS3R3	Electrolytic 50V	3.3	1
C3104, 3105	ECEA1CKS100	Electrolytic 16V	10	2

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
Q619	2SB793A		1	
Q620	2SA963-R		1	
Q621	2SD638(Q,R)		1	
Q622,623	2SB793A		2	
Q624	2SD638(Q,R)		1	
Q625	2SB793A		1	
Q626,627	2SD601(Q,R)	Chip	2	
Q628,629	2SD662(Q,R)		2	
Q630	2SB709(Q,R)	Chip	1	
Q631,632	2SD661(T)		2	
Q644	2SD601(Q,R)	Chip	1	
		Resistors		
R601	ERJ6GICYJ683M	Chip	68K	1
R602	ERJ6GICYJ104M	Chip	100K	1
R603	ERJ6GICYJ222M	Chip	2.2K	1
R604	ERJ6GICYJ561M	Chip	560	1
R605	ERJ6GICYJ390M	Chip	39	1
R606	ERJ6GICYJ823M	Chip	82K	1
R607	ERJ6GICYJ183M	Chip	18K	1
R608	ERJ6GICYJ624M	Chip	620K	1
R609	ERO10CKF5603	1/4W	560K	1
R610	ERJ6GICYJ683M	Chip	68K	1
R611	ERJ6GICYJ154M	Chip	150K	1
R612	ERJ6GICYJ102M	Chip	1K	1
R613	ERJ6GICYJ103M	Chip	10K	1
R622	ERJ6GICYJ562M	Chip	5.6K	1
R623	ERJ6GICYJ123M	Chip	12K	1
R624	ERJ6GICYJ224M	Chip	220K	1
R625	ERJ6GICYJ102M	Chip	1K	1
R626	ERJ6GICYJ220M	Chip	22	1
R627	ERJ6GICYJ472M	Chip	4.7K	1
R628,629	ERJ6GICYJ104M	Chip	100K	2
R630,631	ERJ6GICYJ563M	Chip	56K	2
R632-634	ERJ6GICYJ682M	Chip	6.8K	3
R635	ERJ6GICYJ103M	Chip	10K	1
R636	ERJ6GICYJ473M	Chip	47K	1
R637	ERJ6GICYJ472M	Chip	4.7K	1
R638	ERJ6GICYJ332M	Chip	3.3K	1
R639	ERJ6GICYJ103M	Chip	10K	1
R640,641	ERJ6GICYJ683M	Chip	68K	2
R642	ERJ6GICYJ154M	Chip	150K	1
R643-645	ERJ6GICYJ683M	Chip	68K	3
R646	ERJ6GICYJ154M	Chip	150K	1
R647	ERJ6GICYJ683M	Chip	68K	1
R648-651	ERJ6GICYJ473M	Chip	47K	4
R652	ERJ6GICYJ680M	Chip	68	1
R653	ERJ6GICYJ151M	Chip	150	1
R654	ERJ6GICYJ221M	Chip	220	1
R655	ERJ6GICYJ102M	Chip	1K	1
R656	ERJ6GICYJ274M	Chip	270K	1
R657,658	ERJ6GICYJ331M	Chip	330	2
R659	ERJ6GICYJ221M	Chip	220	1
R660	ERJ6GICYJ122M	Chip	1.2K	1
R661	ERJ6GICYJ332M	Chip	3.3K	1
R662	ERJ6GICYJ273M	Chip	27K	1
R663	ERJ6GICYJ124M	Chip	120K	1
R664	ERJ6GICYJ272M	Chip	2.7K	1
R665	ERJ6GICYJ102M	Chip	1K	1
R666	ERJ6GICYJ274M	Chip	270K	1
R667	ERJ6GICYJ393M	Chip	39K	1
R668	ERJ6GICYJ333M	Chip	33K	1
R669	ERJ6GICYJ153M	Chip	15K	1
R671	ERJ6GICYJ184M	Chip	180K	1
R672	ERJ6GICYJ223M	Chip	22K	1
R673	ERJ6GICYJ333M	Chip	33K	1
R674	ERJ6GICYJ224M	Chip	220K	1
R675	ERJ6GICYJ472M	Chip	4.7K	1

[illegible]

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks	Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Resistors Ass'y							
BR601,602	EVMD6GA00074	10KB	2		C688	ECEA1HKN010	Electrolytic 50V	1	1
					C689	ECEA0JKS330	Electrolytic 6.3V	33	1
					C691	ECQP1152JZ	Mylar 100V	1500P	1
					C692	ECSF1AE476	Tantalum 10V	47	1
					C6116	ECUM1H102KBN	Chip Ceramic 50V	1000P	1
		Capacitors							
C601	ECEA2AS010	Electrolytic 100V	1	1			Coils		
C602	ECUM1H222KBN	Chip Ceramic 50V	2200P	1	L601	EIR7QH001B	30mH	1	
C603	ECQV1H223JZ	Mylar 50V	0.022	1	L602	ELC09K001	10mH	1	
C604	ECEA1AKS470	Electrolytic 10V	47	1	L603	ELH5L128		1	
C605	ECUM1H271KCN	Chip Ceramic 50V	270P	1	L604	VLQ7H101K	100µH	1	
C606	ECQV1H104JC	Mylar 50V	0.1	1	L605	FL9H470K-4D	47µH	1	
C607	ECEA0JKS330	Electrolytic 6.3V	33	1					
C608	ECEA2SC010	Electrolytic 160V	1	1					
C609	ECUM1H472KBN	Chip Ceramic 50V	4700P	1			Fuse		
C610	ECSF1CD225	Tantalum 16V	2.2	1	F601	XBA1H16NU160		1	
C611	ECSF1CD474	Tantalum 16V	0.47	1					
C612	ECEA1CKS100	Electrolytic 16V	10	1					
C613,614	ECSF1CD474	Tantalum 16V	0.47	2			Switches		
C615	ECEA1CKS100	Electrolytic 16V	10	1	SW601	VSSW0019	Mode SW	1	
C616	ECUM1H272KBN	Chip Ceramic 50V	2700P	1	SW602	VSSW0020	Standby SW	1	
C617	ECUM1H102KBN	Chip Ceramic 50V	1000P	1	SW603	VSSW0021	Auto/Date SW	1	
C618	ECUM1H472KBN	Chip Ceramic 50V	4700P	1	SW604	VSSW0020	Standby SW	1	
C619	ECSF1AE106	Tantalum 10V	10	1	SW605	EVQ-QSU05G	Fade SW	1	
C620-622	ECEA1CKS100	Electrolytic 16V	10	3	SW606	EVQ-QSU05G	Back Light SW	1	
C631	ECEA2CS010	Electrolytic 160V	1	1					
C632	ECUM1H101KN	Chip Ceramic 50V	100P	1					
C633	ECQEL104KN	Mylar 100V	0.1	1			Short Plugs		
C635	ECEA2AS010	Electrolytic 100V	1	1	P601	VJFW0003	3P	1	
C637	ECEA0JKS010	Electrolytic 6.3V	100	1	P602	VJFW0006	6P	1	
C638,639	ECEA0JKS470	Electrolytic 6.3V	47	2	P603	VJFW0002	2P	1	
C640	ECEA1AK101	Electrolytic 10V	100	1	P605	EMCS0250Z	2P	1	
C641	ECQP1331JZ	Mylar 100V	0.00033	1	P606	VJFW0004	4P	1	
C642	ECUM1H391KN	Chip Ceramic 50V	390P	1	P607	VJFW0003	3P	1	
C643	ECQV1H104JC	Mylar 50V	0.1	1	P608	EMCS0250Z	2P	1	
C644	ECEA0JKS470	Electrolytic 6.3V	47	1	P609	EMCS0550Z	5P	1	
C645	ECUM1H473ZFN	Chip Ceramic 50V	47000P	1	P610	VJFW0006L	6P	1	
C646	ECEA1ASS331	Electrolytic 10V	330	1	P611	VJFW0002	2P	1	
C647	ECEA1AKN220	Electrolytic 10V	22	1	P612	VJFW0003	3P	1	
C648	ECEA1CKS100	Electrolytic 16V	10	1	P613	VJFW0004	4P	1	
C649	ECUM1H221KN	Chip Ceramic 50V	220P	1					
C650	ECQM1392JZ	Mylar 100V	0.0039	1			Miscellaneous		
C651	ECEA1AKS470	Electrolytic 10V	47	1	CN601	VEKW0774	3P Connector Ass'y	1	
C652	ECEA0JKS470	Electrolytic 6.3V	47	1		VSCW0126	Audio Shield Case (A)	1	
C653,654	ECEA1HKNR47	Electrolytic 50V	0.47	2		VSCW0127	Audio Shield Case (B)	1	
C655	ECEA1CKS100	Electrolytic 16V	10	1		VMZW0131	Audio Barrier	1	
C656	ECQP1152JZ	Mylar 100V	0.0015	1		VSCW0128	Coil Shield Case	1	
C657	ECQB1H103KH	Mylar 50V	0.01	1					
C658	ECUM1H911KN	Chip Ceramic 50V	910P	1					
C659	ECUM1E104ZFN	Chip Ceramic 25V	0.1	1		VEPW0272	A.V.R. C.B.A.		
C660	ECUM1H271KN	Chip Ceramic 50V	270P	1					
C661	ECUM1H221KCN	Chip Ceramic 50V	220P	1			Integrated Circuits		
C662,663	ECEA0GKS470	Electrolytic 4V	47	2	IC604	NJM2904M		1	
C664	ECQV1H684JZ	Mylar 50V	0.68	1	IC605	NJM2902M		1	
C665,666	ECEA0JK221	Electrolytic 6.3V	220	2					
C667,668	ECEA1AK101	Electrolytic 10V	100	2					
C669	ECEA0JKS101	Electrolytic 6.3V	100	1			Transistor		
C670	ECEA1ESS101	Electrolytic 25V	100	1	Q618	2SD601(Q,R)	Chip	1	
C671	ECEA1CSS471	Electrolytic 16V	470	1					
C672	ECEA1CKS100	Electrolytic 16V	10	1					
C673	ECSF1CD105	Tantalum 16V	1	1					
C674	ECEA1CKS100	Electrolytic 16V	10	1					
C675,676	ECUM1H680KN	Chip Ceramic 50V	68P	2					
C681	ECEA1AK101	Electrolytic 10V	100	1					
C682	ECEA0GKS101	Electrolytic 4V	100	1					
C683	ECEA1AK101	Electrolytic 10V	100	1					
C684	ECEA1HKS2R2	Electrolytic 50V	2.2	1					
C685	ECEA1CKS100	Electrolytic 16V	10	1					
C686	ECEA1AK101	Electrolytic 10V	100	1					
C687	ECUM1H472KBN	Chip Ceramic 50V	4700P	1					

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		Resistors		
R689	ERJ6GJYJ471M	Chip 470	1	
R690	ERJ6GJYJ472M	Chip 4.7K	1	
R691	ERJ6GJYJ681M	Chip 680	1	
R693	ERJ6GJYJ222M	Chip 2.2K	1	
R697	ERJ6GJYJ563M	Chip 56K	1	
R698	ERJ6GJYJ472M	Chip 4.7K	1	
R699	ERJ6GJYJ103M	Chip 10K	1	
R6100	ERJ6GJYJ562M	Chip 5.6K	1	
R6101	ERJ6GJYJ123M	Chip 12K	1	
R6102	ERJ6GJYJ153M	Chip 15K	1	
R6103	ERJ6GJYJ183M	Chip 18K	1	
R6105	ERJ6GJYJ681M	Chip 680	1	
R6107	ERJ6GJYJ681M	Chip 680	1	
R6109	ERJ6GJYJ681M	Chip 680	1	
R6123	ERJ6GJYJ681M	Chip 680	1	
R6129,6130	ERJ6GJYJ103M	Chip 10K	2	
	VEPW0254	Auto Date C.B.A.		
		Integrated Circuits		
IC701	MPD7507SC-018		1	
IC702	MN1237AD		1	
		Transistors		
Q701	2SB709(Q,R)	Chip	1	
Q702,703	2SD601(Q,R)	Chip	2	
Q708	2SB709(Q,R)	Chip	1	
		Diodes		
D701,702	MA151K	Chip	2	
D703	MA151WA	Chip	1	
		Resistors		
R702	ERJ6GJYJ560M	Chip 56	1	
R703	ERJ6GJYJ105M	Chip 1M	1	
R704,705	ERJ6GJYJ563M	Chip 56K	1	
R706	ERJ6GJYJ123M	Chip 12K	1	
R707-709	ERJ6GJYJ563M	Chip 56K	3	
R710	ERDS2TJ563	Resistor 56K	1	
R711	ERTD2FHL802S	Thermistor 8K	1	
R713-716	ERJ6GJYJ563M	Chip 56K	4	
R717	ERJ6GJYJ472M	Chip 4.7K	1	
R725-733	ERJ6GJYJ105M	Chip 1M	9	
R735	ERJ6GJYJ154M	Chip 150K	1	
R737	ERJ6GJYR000	Chip 0	1	
		Capacitors		
C701,702	ECUM1H101KCN	Chip Ceramic 50V 100P	2	
C703	ECUM1H330KCN	Chip Ceramic 50V 33P	1	
C704	ECEA1CKS100	Electrolytic 16V 10	1	
C705	ECUM1H102KCN	Chip Ceramic 50V 1000P	1	
C707	ECCF1H270KW	Ceramic 50V 27P	1	
C708	ECEAOJK221X	Electrolytic 6.3V 220	1	
C725	ECUM1H683ZFN	Chip Ceramic 50V 68000P	1	
C726	ECSF1AD225	Tantalum 10V 2.2	1	
C727	ECUM1H820KN	Chip Ceramic 50V 82P	1	
C728	ECSF1AD225	Tantalum 10V 2.2	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		Variable Resistors		
VR701	EVML4GA00B15	100KB	1	
VR702	EVML4GA00B33	3KB	1	
		Coil		
L701	EL0405SR101K	100uH	1	
		Crystal		
X701	VSX0094	32kHz	1	
		Switches		
SW703	EVQQS205K	ADJ. SW	1	
SW704	EVQQS205K	SEL. SW	1	
SW705	EVQQS205K	SET SW	1	
		Miscellaneous		
	VEKW0736-1	6P Connector Ass'y	1	
	VJJW0008	EXT. Tally Jack	1	
	LR44H	Cell	2	
	VMDW0053	Cell Terminal Holder	1	
	VMBW0050	Cell Terminal (A)	1	
	VMBW0051	Cell Terminal (B)	1	
	VSCW104	Auto Date Shield Case (A)	1	
	VSCW105	Auto Date Shield Case (B)	1	
	VMZW118	Auto Date Barrier	1	
	VEKW0828	Lug Terminal Ass'y	1	
	VEPW0253	High Voltage Print C.B.A.		
		Diodes		
D6001	MA171A		1	
D6002	ERB28-04D		1	
D6003-6005	MA171A		3	
		Resistors		
R6001	ERJ8GJYJ334W	Chip 330K	1	
R6002	ERJ8GJYJ103W	Chip 10K	1	
R6003	ERJ8GJYJ105W	Chip 1M	1	
R6004	ERJ8GJYJ223W	Chip 22K	1	
R6005,6006	ERD25VJ105	Resistor 1/4W 1M	2	
R6007	ERD25VJ185	Resistor 1/4W 1.8M	1	
R6008	ERD25VJ225	Resistor 1/4W 2.2M	1	
R6009	ERDS2TJ682	Resistor 1/4W 6.8K	1	
		Variable Resistors		
VR6001	VRVW0004	1MB	1	
VR6002	EVML4GA00B16	1MB	1	
VR6003	EVML4GA00B26	2MB	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Capacitors		
C6001,6002	ECUM1E104ZFN	Chip Ceramic 25V 0.1	2	
C6003	ECQE10472MV	Mylar 1KV 0.0047	1	
C6004	ECQM4472MZ	Mylar 400V 0.0047	1	
C6005	ECQE4473MZ	Mylar 400V 0.047	1	
C6006	ECEA2SW010	Electrolytic 450V 1	1	
C6007	ECEA1HKS4R7	Electrolytic 50V 4.7	1	
C6008,6009	ECUM1E104ZFN	Chip Ceramic 25V 0.1	2	
C6010	ECQE1823KN	Mylar 100V 0.082	1	
C6011	NCKD3A1392KB	Ceramic 1KV 3900P	1	
C6012	NCKD3A152KB	Ceramic 1KV 1500P	1	
C6013	ECQE2104KS	Mylar 250V 0.1	1	
C6014	ECSF1VE474	Tantalum 35V 0.47	1	
		F.B.T.		
T6001	ETP-19LSA		1	
		Miscellaneous		
	VEKW0737	Tube Socket Ass'y	1	
	VEKW0738	CRT Socket Ass'y	1	
	VEKW0830	LUG Terminal Ass'y	1	
	VEPW0273	Power Zoom C.B.A.		
		Transistors		
Q801-804	2SD601(Q,R)	Chip	4	
		Resistors		
R801,802	ERJ6GCTJ103M	Chip 10K	2	
R803	ERJ6GCTJ562M	Chip 5.6K	1	
R804,805	ERJ6GCTJ822M	Chip 8.2K	2	
		Miscellaneous		
CN801	VEKW0735-1	5P Connector Ass'y	1	
	VEPW0274	Tally SW B C.B.A.		
		Switch		
	VSSW0022	Tally SW	1	
		Miscellaneous		
	VMAW0185	Tally SW Angle	1	
	VEPW0281	Tally SW C.B.A.		
		Switch		
	VSSW0023	Tally	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		Miscellaneous	1	
	VEKW0740	Tally Cable Ass'y	1	
		Miscellaneous		
	S4400	Newvicon	1	
	ELV11A501A	DY Ass'y	1	
	VEKW0726-1	Camera Cable Ass'y	1	
	MD1JG09WB	CRT	1	
	ELT-05V402A	EVF DY Ass'y	1	
	VEKW0741	Bias Light Ass'y	1	
	VEKW0739	Power Transistor Ass'y	1	
	VEKW0742	MIC Jack Ass'y	1	
CN001	VJBW0345	F.P.C. (I)	1	
CN002	VJBW0346	F.P.C. (J)	1	
CN003	VJBW0344	F.P.C. (H)	1	

Auto Focus Section

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
1	VKUW0049	HOOD CAP	1	
2	VKUW0050	LENS HOOD	1	
3	VMGW0072	FOCUS RING RUBBER	1	
4	VKGW0586	DISTANCE INDICATOR RING	1	
5	VXDW0010	LENS BARREL RING ASS'Y	1	
6	VYKW0633	REFLECTION RING ASS'Y	1	
7	VVAW0021	IRIS MOTOR ASS'Y	1	
8	VXDW0011	MASTER LENS ASS'Y	1	
9	VMSW0053	MASTER LENS HOLDER	1	
10	VEKW0834	A.F. MOTOR ASS'Y	1	
11	VXAW0050	S.P.D. ASS'Y	1	
12	VKGW0587	A.F. LENS COVER A	1	
13	VFLW0087	CONDENCER LENS	1	
14	VMAW0238		1	
15	VEKW0836	END SW ASS'Y	1	
16	VEKW0837	A/M FOCUS SW ASS'Y	1	
17	VKGW0588	TOP COVER	1	
18	VMAW0239	P.C.B. HOLDER	1	
19	VSCW0156	SHIELD PIECE A	1	
20	VSCW0158	SHIELD PIECE C	1	
21	VSCW0157	SHIELD PIECE B	1	
22	VHZW0157	INSULATION SHEET	1	
23	VMAW0240	RADIATION PLATE	1	
24	VEKW0838	LED ASS'Y	1	
25	VMAW0241	LED HOLDER	1	
26	VMBW0069	LED ADJUSTMENT SPRING	1	
27	VMBW0070	GROUND PLATE	1	
28	VYKW0634	BUTTON COVER ASS'Y	1	
29	VEKW0835	ZOOM MOTOR ASS'Y	1	
30	VXAW0051	A.F. FILTER ASS'Y	1	
		RELAY LENS ADJUSTMENT		
31	VMAW0237	SCREW HOLDER	1	
		RELAY LENS ADJUSTMENT		
32	VMSW0054	SCREW	1	
33	VGPW0312	A.F. SW PLATE	1	
34	VMGW0073	P CUSHION RUBBER RING	4	
35	VMFW0040	CUSHION SPONGE	1	
36	VMGW0074	STOPPER RUBBER	1	
37	HW2.1X6-0.5	WASHER	1	
		SCREW		
		PAN HEAD PRECISION SCREWS		
38	XQN2+A4FXK	M2x4	3	
39	XQN2+A35FXK	M2x3.5	3	
40	XQN2+A22FXK	M2x2.2	3	
41	XQN2+A22FN	M2x2.2	3	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
42	XQN2+AF35FXK	M2x3.5	3	
43	XQN17+AF2FXK	M1.7x2	1	
44	XQN17+C3FXK	M1.7x3	1	
45	XQN2+C10FXK	M2x10	1	
46	XQN23+C15FN	M2.3x15	4	
47	XQN2+CF35FXK	M2x3.5	2	
48	XQN2+CF45FXL	M2x4.5	1	
49	XQN2+CF45FXK	M2x4.5	4	
50	XQN2+CF5FXK	M2x5	1	
51	XQN17+CF4FXK	M1.7x4	2	
52	XQN17+CF35FXK	M1.7x3.5	3	
53	VHDW0043	M2x4	2	
54	VHDW0044	M2x4.5	1	
55	VHDW0046	P MOTOR FIXING SCREW	2	

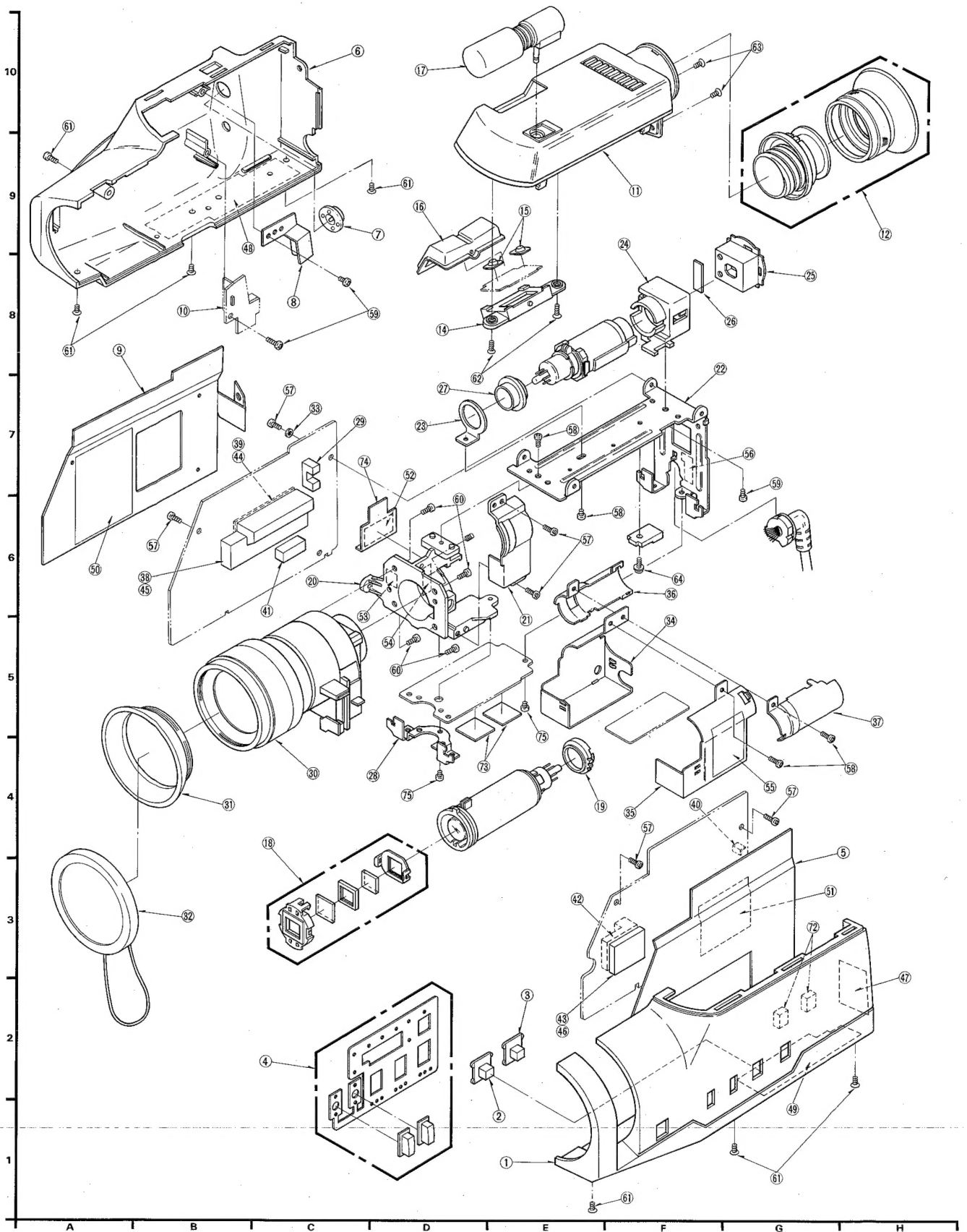
Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		Auto Focus (A) C.B.A.	1	
		Auto Focus (B) C.B.A.	1	
		W.B. SW C.B.A.	1	
		Integrated Circuits		
IC5101	HH6952		1	
IC5102	AN78L05		1	
		Diodes		
D5101	MA1062	Zener Diode	1	
D5102	MZ303C	Zener Diode	1	
		Transistors		
Q5101	2SC2458	NPN Silicon	1	
Q5102	2SB632	PNP Silicon	1	
		Resistors		
R5101	RDNU474JK	1/6W 470K	1	
R5102,5103	RDNU184JK	180K	2	
R5104	RDNU102JK	1K	1	
R5105	RDNU103JK	10K	1	
R5106	RDNU222JK	2.2K	1	
R5107	RSDT180J	1/2W 18	1	
R5108	RSFT330J	1W 33	1	
R5109	RDNU474JK	1/6W 470K	1	
		Variable Resistors		
VR5101	VK05RH3-204	200KB	1	
VR5102,5103	VK07RH3-503	50KB	2	
VR5104,5105	VK05RH3-204	200KB	2	
		Capacitors		
C5101,5102	CSD10D220MM3	Tantalum 10V	22	2
C5103	CEX25C471QK	Electrolytic 25V	470	1

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		Switches		
SW5101	LV023FMES01A	A Filter SW	1	
	LV016FMES01A	AF SW	1	
	LV021FMES01A	END SW	1	
		Connectors		
P5101	LV015FMEJ06A		1	
P5102	LV016FMEJ02A		1	
P5103	LV021FMEJ14A		2P	2
P5104	LV014FVEJ06A		1	
P5105	LV021FMEJ14A		2P	2
	LV023FMEJ02A		1	
	LV023FMEJ07A		1	
	LV023FMEJ08A		1	
	LV023FMEJ09A		1	
		Miscellaneous		
	HLP-30RG	IR-LED Ass'y	1	
	LV023FMEW01A	Insulationwire	1	
	VEKW0839	A Filter SW Ass'y	1	

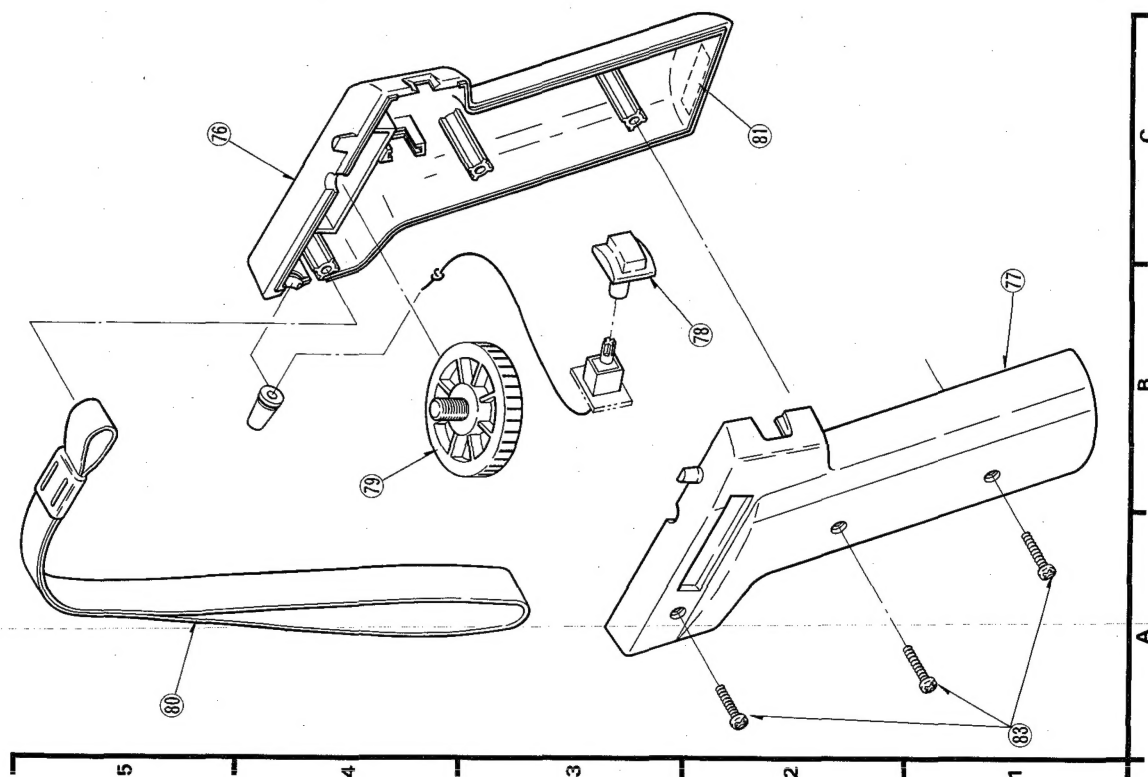
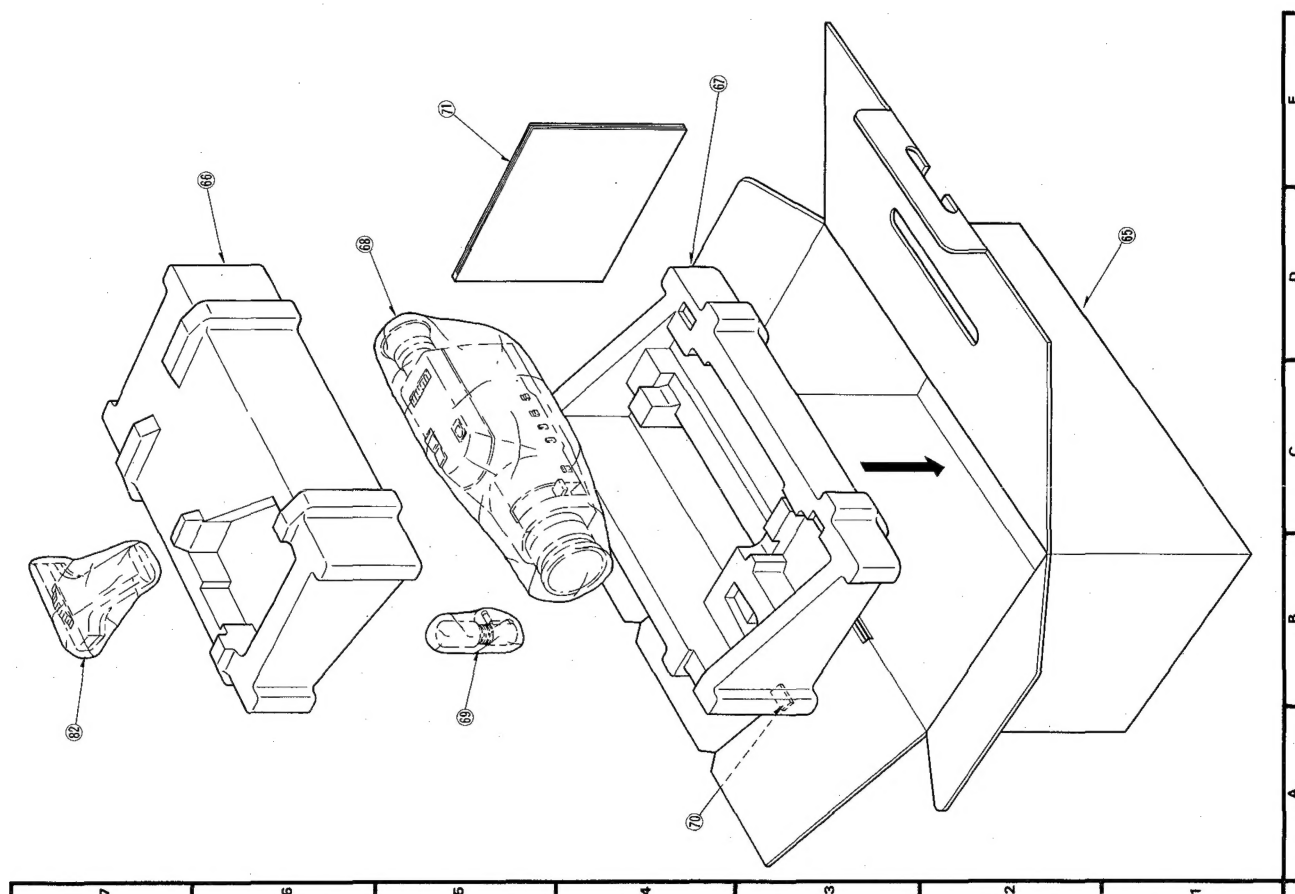
(MANUAL FOCUS SECTION)

EXPLODED VIEW

1 Camera Unit Section



② Pistol Grip and Packing Parts Section



Mechanical Replacement Parts List

Note: Be sure make your orders of replacement parts according to this list.

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		C.S.U.		
1	VKGW0520	MF SIDE COVER (R)	1	
2	VGW0121	AWB KNOB	1	
3	VGW0122	STANDBY KNOB	1	
4	VXEW0002	BUTTON PLATE ASS'Y	1	
5	VMZW0132	BARRIER (R)	1	
6	VYKW0573	MF SIDE COVER (L) ASS'Y	1	
7	VGW0100	TALLY BUTTON	1	
8	VMEW0045	TALLY BUTTON PLATE	1	
9	VMZW0133	BARRIER (L)	1	
10	VMAW0185	TALLY SW ANGLE	1	
11	VYKW0673	TOP COVER UNIT	1	
12	VYKW0533	LENS HOLDER ASS'Y	1	
14	VMDW0052	HOLDING PIECE	1	
15	VMGW0052	RUBBER SWITCH	2	
16	VGW0099	ZOOM SWITCH KNOB	1	
17	VXW00033	MIC ASS'Y	1	
18	VXEW0023	FILTER ASS'Y	1	
19	VMDW0051	BIAS LIGHT HOLDER	1	
20	VMKW0041	MAIN CHASSIS	1	
21	VMKW0042	CHASSIS COVER	1	
22	VMAW0175	SUB CHASSIS	1	
23	VMAW0177	CRT FIXING ANGLE	1	
24	VKGW0427	CRT HOLDER	1	
25	VMAW0178	CRT PROTECTION PLATE	1	
26	VGLW0003	LED SHEET	1	
27	VMGW0016	CRT FIXING BUSH	1	
28	VMAW0176	P.C.B. FIXING ANGLE	1	
29	VMKW0063	LED SPACER	1	
30	VFLW0071	X6 MANUAL FOCUS LENS	1	
31	VKW00050	LENS HOOD	1	
32	VXJW0007	HOOD CAP ASS'Y	1	
33	VMZW3X8X0.5	FIBER WASHER	1	
72	VKGW0071	SIDE COVER CUSHION	2	
76	VKHW0053	GRIP (R)	1	
77	VKHW0054	GRIP (L)	1	
78	VGW0117	TALLY SW BUTTON	1	
79	VKGW0069	HANDLE ROLLER	1	
80	VFBW0014	HAND STRAP	1	
		CASE		
34	VSCW0100	PRE-AMP SHIELD CASE (A)	1	
35	VSCW0101	PRE-AMP SHIELD CASE (B)	1	
36	VSCW0102	SOCKET SHIELD CASE (A)	1	
37	VSCW0103	SOCKET SHIELD CASE (B)	1	
38	VSCW0124	SYNC SHIELD CASE (A)	1	
39	VSCW0125	SYNC SHIELD CASE (B)	1	
40	VSCW0128	COIL SHIELD PLATE	1	
41	VSCW0129	DL SHIELD PLATE	1	
42	VSCW0126	AUDIO SHIELD CASE (A)	1	
43	VSCW0127	AUDIO SHIELD CASE (B)	1	
44	VMZW0129	SYNC BARRIER (A)	1	
45	VMZW0130	SYNC BARRIER (B)	1	
46	VMZW0131	AUDIO BARRIER	1	
73	VMZW0164	GROUND BARRIER	2	
74	VMZW0161	CONNECTOR BARRIER	1	
		LABEL		
47	VQLW0657	CAUTION LABEL (C)	1	
48	VQLW0656	CAUTION LABEL (F)	1	
49	VQLW0642	CAUTION LABEL (G)	1	
50	VQLW0635	WARNING LABEL	1	
		HIGH VOLTAGE CAUTION		
51	VQLW0636	LABEL B	1	

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
		HIGH VOLTAGE CAUTION		
52	VQLW0653	LABEL A	1	
53	VQLW0652	CRT PIN INDICATION LABEL	1	
54	VQLW0074	CHASSIS LABEL	1	
55	VQLW0633	CAUTION LABEL (D)	1	
	VQLW0615-1-			
	VQLW0627-1			
	VQLW0750-			
56	VQLW0755	TARGET INDICATION LABEL	1	
81	VQLW0687	MADE IN JAPAN LABEL	1	
		SCREW		
		BINDING HEAD MACHINE		
75	XSB26+5FU	SCREWS M2.6x5	2	
57	XSB26+6FU	M2.6x6	6	
58	XSB26+4FU	M2.6x4	4	
		BINDING HEAD TAPPING		
59	XTB26+5GFU	SCREWS M2.6x5	3	
60	XTB26+8GFU	M2.6x8	4	
83	XTB26+16GFXX	M2.6x16	3	
		FLUSH HEAD TAPPING SCREWS		
61	XSS26+6FC	M2.6x6	7	
		FLUSH HEAD TAPPING SCREWS		
62	XTS26+6GFU	M2.6x6	2	
		OVAL COUNTERSUNK HEAD		
63	XSC26+6FC	MACHINE SCREWS M2.6x6	2	
		FAN HEAD WITH WASHER		
64	XYN26+P6FU	ASS'Y M2.6x6	1	
		PACKING CASE		
65	VPKW0417	PACKING CASE	1	
66	VFGW0105	CUSHION TOP	1	
67	VPGW0106	CUSHION BOTTOM	1	
68	XZB22X70A02	POLY BAG FOR CAMERA HEAD	1	
69	XZB5X12A02	POLY BAG FOR MIC ASS'Y	1	
82	XZB16X27A02	POLY BAG FOR GRIP	1	
70	VPOW0004	HANDLE	1	
71	VQFW0170	FAN BAG KIT	1	

Electrical Replacement Parts List

Note:

1. Be sure to make your orders of replacement parts according to this list.

2. IMPORTANT SAFETY NOTICE

Components identified by shade have special characteristics important for safety.

When replacing any of these components, use only the original ones.

3. Unless otherwise specified:

All resistors are in OHMS (Ω), 1/Bw, 5% carbon, K=1,000, M=1,000,000.

All capacitors are in MICROFARADS (μ F), 10%, P=PPF.

All coils are in MICROHENRIES (μ H), m=10³, μ .

4. C.B.A: Circuit Board Assembly.

5. C.B: Circuit Board

SPECIAL NOTE All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described under the "Electrostatically Sensitive (ES) Devices" section of this service manual.

Ref. No.	Part No.	Part Name & Description	Pcs / Set	Remarks
	VEPW0251A	Process C.B.A.		
	VEPW0252A	Deflection C.B.A.		
	VEPW0273	Power Zoom C.B.A.		
	VEPW0255	Tally SW A C.B.A.		
	VEPW0251A	Process C.B.A.		
		Short Plugs		
P301	VMCS0650ZL	6P	1	
	VEPW0255	Tally SU A C.B.A.		
		Switches		
	VSSW0022	Tally SW	1	
		Miscellaneous		
	VMAW0185	Tally SW Angle	1	
	VJJW0008	Tally Jack	1	
	VEKW0743	2P Connector Ass'y	1	

Note: This list indicates only the part numbers which are different from them of Auto Focus Section. Please refer to the list of Auto Focus Section for remaining items.